Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Mineral Industry Report 1982 – 83
Northwest Territories

Canada

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Northwest Territories

EGS - 1985 - 4

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Minister of Supply and Services Canada 1985. Available by mail from Printing and Publishing, Supply and Services Canada, Ottawa K1A OS9 or the Geology Division, Department of Indian Affairs and Northern Development, Box 1500, Yellowknife, N.W.T. X1A 2R3

Catalogue No.: R71-9/1983-2E

ISBN: 0-662-14068-0

Price Canada: $10.00
Price other countries: $12.00
Price subject to change without notice.

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Hon. David E. Crombie, P.C., M.P.,
Minister of Indian Affairs and
Northern Development,
Ottawa, 1985.

QS – Y029 – 000 – EE – A1

RESUME

INTRODUCTION

Le present rapport traite de l'industrie d'exploration et d'exploitation minières des Territoires du Nord-Ouest (TNO) dans les années 1982 et 1983. Il a été rédigé a Yellowknife par le personnel de la Division de la Geologie du Programme des Affaires du Nord, ministère des Affaires Indiennes et du Nord Canada. M. John Brophy, géologue du bureau, a édité les contributions des auteurs de chaque chapitre.

ORGANIZATION DU RAPPORT

Le rapport comprend 8 chapitres. Le premier chapitre donne un sommaire de l'activité minière et décrit la fonction et les activités de la Division de la Geologie. Le deuxieme chapitre décrit la géologie et la production des mines en opération durant 1982 et 1983. Les 6 autres chapitres décrivent l'exploration minières dans chaqu'une des provinces et sous-provinces géologiques délimitées dans les TNO. Les provinces sont introduites, en guise du préface, par une brève description géologique et un aperçu de l'exploration dont elles ont fait l'objet. Les propriétés explorées dans chaque province ou sous-province sont généralement présentées selon le systeme national de cartographie.

Les descriptions des propriétés explorées sont composées de sept parties. Le TITRE comprend le nom de la compagnie a qui appartient la propriété, les métaux récherchés et l'emplacement de la propriété selon le systeme national de cartographie et les coordonnés de latitude et de longitude. La section REFERENCES comprend une liste des publications dans lesquelles sont décrit la géologie et les travaux effectués auparavant sur la propriété. En plus, on a ajouté cette année les numéros des rapports d'evaluation des mines dont on s'est servi pour décrire les travaux effectués et les résultats obtenus. Les deux sections suivantes indiquent les noms des PROPRIETES explorées et leur EMPLACEMENT. La cinquieme section décrit l'HISTOIRE de l'exploration sur la propriété et la sixieme comprend une DESCRIPTION de la geologie et des gisements de minerai découverts auparavant. La dernière partie est une description des TRAVAUX EFFECTUES en 1983 et 1983 et des résultats de ces travaux. Puisque l'information inclue dans cette partie est abstraite des rapports d'évaluation des mines, la permission des compagnies a qui appartiennent les propriétés a ete obtenue avant la publication de ce rapport.

APERCU GENERALE DE L'EXPLORATION

Près de 50% moins de projets d'exploration ont été entrepris dans les TNO en 1982 (113) et 1983 (115) qu'en 1981 (218). La superficie jalonnes a décrut de 80% en 1982 mais a augmenté de 115% en 1983. Par contre, le nombre de permis de prospection émis en 1982 (91) et en 1983 (96) étaient plus qu'en 1981 (73)

L'or est devenu le métal le plus recherché, déplacant l'uranium. Ceci se traduit par une augmentation du nombre de travaux entrepris dans la province des Esclaves en 1983 et une diminution des travaux dans la province de Churchill. Le nombre de projets entrepris dans les autres regions des TNO demeure fixe a 50% du nombre entrepris en 1981.

APERCU GENERAL DE LA PRODUCTION MINIERE

Deux nouvelles mines, le dépot aurifere de Lupin (Echo Bay Mines Ltd.) et le dépot d'argent de Smallwood (Terra Mines Ltd.), ont été ouvertes en 1982. Les douze mines des TNO ont produit $595 million de métaux et ont employé 2700 personnes en 1982. La valeur de métaux produits en 1983, $514 million, marque une diminution de 14% causée par la fermeture de la mine Eldorado, la cessation d'opérations à la mine Pine Point pour cinq mois et à la mine Cantung pour 11 mois. Le dépot aurifère de Salmita a été ouvert par Giant Yellowknife Mines Ltd. en 1983.

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CHAPTER 1: INTRODUCTION

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This report describes mining and mineral exploration conducted in the Northwest Territories (NWT) in 1982 and 1983. It was prepared by the staff of the Geology Division of the Northern Affairs Program, Department of Indian and Northern Affairs (DIAND), Yellowknife, NWT. It is one of a series of reports that have been produced annually or bi-annually since responsibility for monitoring and reporting on mining and mineral exploration were assumed by DIAND in 1969.

SUMMARY OF MINING AND MINERAL EXPLORATION

The NWT mining industry fared remarkably well during the general mining recession that began in 1981. The decline in the price of silver caused considerable problems for silver producers in the Great Bear Lake silver districts, and brought to an end attempts to bring the Prairie Creek silver-base metal vein deposits of Cadillac Mines Ltd to production. The sharp decline in tungsten prices together with severe restrictions in demand for this metal forced Canada Tungsten Mining Ltd to cease production at its Cantung mine for most of 1983. Similar though less precipitous declines in the price and demand for lead and zinc forced Pine Point Mines Ltd to close the Pine Point Mine for 6 months in 1983. Conditions, price and market demand improved during late 1983 and production recommenced in June at Pine Point mines after only a half-year interruption and at Cantung in December.

These negative effects on the NWT's mineral economy were offset considerably by production from three new gold mines, (B-Zone, Salmita and Lupin) and by production from the rich lead-zinc deposit at Polaris, the world's most northerly metal mine. The fact that the Polaris and Nanisivik mines are on tide water permits their zinc-rich ores to remain competitive in world markets during periods of low demand.

Production from the new gold mines became firmly established during the period and a strong gold price contributed to maintaining healthy production from the much older Yellowknife-area mines.

Exploration expenditures in 1982 and 1983 ranged between 25 and 30 million dollars each year. Figures vary between reporting agencies because some report exploration expenditures in and around mines and others do not. Also, not all explorers make their expenditures known.

Mineral exploration, which declined precipitously in 1981 to about 60% of the 1979-1980 boom levels when nearly 50 million dollars was expended, was undergoing a major re-deployment of effort.

Uranium was the major target from about 1977 to 1981, having replaced to a large extent base metal exploration, which had been the number one target through most of the previous 15 years. Gold replaced uranium as the major target commodity in late 1980. Because exploration for gold was carried out mainly by junior companies that had difficulty in raising funds during a period (1980-1982) of high inflation, high interest rates and general economic difficulties, and because many uranium exploration programs were conducted by large, well-financed organizations, the change from uranium exploration to gold exploration was gradual. Many costly drill programs to test uranium prospects discovered during the boom continued during the review period and cushioned the exploration sector from much of the decline underway in adjoining parts of Canada.

Though uranium exploration expenditures continued to decline through 1983, base metal exploration expenditures had stabilized at a healthy level, mainly because of the search for additional ore reserves around the operating mines. Expenditures for gold exploration were up significantly. Interest in the coal resources of the high Arctic and, to a lesser extent, in the Interior Platform and Cordillera contributed significantly to exploration expenditures during the review period.

At the end of 1983 mineral exploration in the NWT appeared to have entered a time of more balanced exploration effort with continued expenditures on uranium, base-metals, silver, tungsten and coal and a gradual increase in expenditures on gold. There are signs that a number of gold deposits of economic grade and tonnage can be expected to see development over the next five years.

Oil and gas exploration, which is monitored by COGLA (Canadian Oil and Gas Lands Administration) and not by the Geology Division, were important components of the mineral industry. Production was stable at Norman Wells, but expenditures on pipeline and field development became extensive during the review period. When this billion dollar development is completed, NWT oil production should expand to 10 times its present level. Gas production from the Pointed Mountain field declined, but might be replaced in the near future if nearby fields that are now under development are exploitable.

Oil and gas exploration, a major contributor to the northern economy, was confined mainly to younger fold belts of the NWT (Innuitian and Cordilleran) and to the Beaufort Sea/Mackenzie Delta, part of the continental shelf. Restructuring of the oil and gas land leasing system took place during the first few years of the 1980's under the Petroleum Incentives Program.

Four geologists monitored non-hydrocarbon mineral exploration and mining during the review period.

P.J. Laporte monitored the District of Keewatin, which covers a large part of the Churchill Structural Province including areas of reworked Archean granite-greenstone terrain and extensive late volcanics and post-tectonic continental sandstones and conglomerates. Exploration for unconformity related uranium deposits focused on areas believed to be close to the unconformity between the basement and the continental sediments. Gold and minor base metal work concentrated on the reworked Archean and adjacent younger metamorphosed supracrustals.

J.B. Seaton monitored activity in the Archean Slave and adjacent Proterozoic Bear Structural Provinces. Targets included silver and uranium in the Bear and mainly gold, but also volcanogenic silver-base metal and rare metal pegmatites, in the Slave.

C. Lord monitored the NWT portion of the Cordillera and adjacent parts of the Interior Platform as far east as 128°W longitude. Targets in this area include tungsten and shale-hosted lead-zinc along the Selwyn Basin-Mackenzie Arch hinge zone and gold disseminated in and around intrusives in the hinge zone and in the streams of the Liard-Nahanni drainage basin. Silver, coal and barite are also potential targets, though little was done on these in the period under review.

The remainder of the territory was monitored by W.A. Gibbins. His district includes 1) the Pine Point mining district and adjacent parts of the Great Slave lowlands where targets are lead and zinc, 2) the East Arm of Great Slave lake (Athapuscaw Aulacogen) and related Proterozoic intrusives along the south edge of the Slave Province, where targets include uranium, silver, copper and, in the intrusives, rare metals, 3) the Churchill Province west of the Keewatin where the main target is uranium, and 4) the Arctic Islands where lead-zinc, coal, uranium, iron and rare element pegmatites have been found.

Mineral exploration expenditures and the number of properties examined in 1983 are about the same as they were in 1982, but the number of exploration groups involved probably increased. This reflects a shift from base metal and uranium exploration, which has been dominated by large companies, to gold exploration, which attracts a higher proportion of prospectors, smaller exploration groups and junior mining companies. In 1983, there were more gold exploration projects (53) than base-metal projects (19) and uranium projects (25) combined. Table 1 shows where exploration took place within the various NWT Districts. Nearly 45% of all exploration projects were for gold.

TABLE 1-1: COMPARISON OF ACTIVITY IN VARIOUS AREAS

GEO-REGION	NUMBER OF PROPERTIES EXPLORED								
	1975	1976	1977	1978	1979	1980	1981	1982	1983
Cordillera	25	28	13	14	21	29	24	12	11
Arctic Islands Baffin and Melville	8	9	6	8	4	7	24	16	11
Keewatin (Churchill Prov.)	31	37	38	36	48	53	59	34	25
SE Mackenzie (Churchill Prov. Nonacho & Thelon Areas)	3	7	11	7	13	14	25	10	11
East Arm	10	7	2	7	6	4	14	3	1
Pine Point	3	4	3	7	5	6	6	3	2
Bear Prov.	18	27	35	32	32	22	24	10	11
Slave Prov.	44	44	28	29	33	29	42	25	44
TOTALS (NWT)	142	163	136	140	162	164	218	113	116

Table 2 relates projects and commodities to the main area and predominant age of rocks containing the target commodities.

Because of large expenditures in the Pine Point District and around Nanisivik, a considerable amount (probably at least $6 million each year) was expended on base-metal exploration. More than half of this was spent in the Pine Point District. Expenditures on uranium exploration continued to decline and were probably down to $4 million in 1983.

TABLE 1-2: NORTHWEST TERRITORIES 1982/83 EXPLORATION BY COMMODITY

COMMODITY	AGE OF MAIN HOST ROCKS (GEOLOGICAL PROVINCE)	NO. OF PROJECTS	
GOLD	ARCHEAN (SLAVE)	(25)	53
URANIUM	PROTEROZOIC (BEAR/CHURCHILL)	(36)	25
SILVER	PROTEROZOIC	(3)	9
BASE METALS	ALL AGES	(30)	19
RARE METALS	ARCHEAN/PALEOZOIC	(15)	7
COAL	CRETACEOUS TERTIARY	(2)	1
IRON	PROTEROZOIC	(2)	1
	TOTAL	(113)	115

In 1983, several rare-metal exploration projects were conducted, including: 3 tungsten drilling projects; one tungsten mine under development in the Cordillera; one rare-metal exploration project in the Slave Province; and two rare-metal projects in the Blatchford Lake complex on the edge of the East Arm Subprovince. With coal, iron and silver exploration this work represents another $2 million in expenditures.

Expenditures on gold exploration and gold property (mine) development, approximately $12 million, aggregated about one half the total expenditure (20 to 25 million) on mineral exploration in the NWT during 1983, up slightly from 1982 levels.

Land acquisition (Table 4) was mainly in areas with gold potential, and barring a significant decline in the price of gold, exploration in areas of gold potential will increase dramatically in the next few years. Targets will be mainly in the Slave Province, but also in the Cullaton Lake area of the Ennadai-Rankin (Kaminak) Volcanic Belt and around Cretaceous intrusions in the Cordillera, where significant gold assays have been recorded in base metal and tungsten-bearing skarns. Placers in the Liard Valley are also targets of some potential.

Table 1 shows the shift of exploration from area to area as different commodities; base metals, uranium and gold; became major targets. Pine Point, Arctic Islands and the Cordillera are primarily base metal areas; Bear and Churchill provinces primarily uranium. The Slave Province hosts as yet uneconomic volcanogenic base metal and silver-base metal deposits and numerous gold deposits, as does the Kaminak Volcanic Belt in the Keewatin.

Table 3 shows higher-cost projects that include drilling (54 projects in 1983, a 20% increase over 1982) and mining development (8, a 60% increase over 1982). Most of the increase is in small-scale gold operations that will not add greatly to value of production.

TABLE 1-3: HIGH COST PROJECTS

	1975	1976	1977	1978	1979	1980	1981	1982	1983
Drilling Projects	47	41	40	52	61	81	58	45	54
Mines in Development	5	3	2	2	4	6	12	5	8
Mines in Production	6	6	7	7	8	9	11	12	12
TOTAL	58	50	49	61	73	96	81	62	74

MINING LAND ACQUISITION

The NAP Mining Lands Division administers most aspects of mineral rights tenure in NWT. Claim maps, mineral property maps and Territorial Resource Base Maps are available on the fourth floor of the Bellanca Building.

The NWT is divided into three Mining Districts, Arctic and Hudson Bay, Mackenzie and the much smaller Nahanni District. Staking records and statistics are kept by the mining recorders of the Mining Lands Division relating only to these areas. For this report these have been reassembled (Table 4) to show activity level by geological areas.

Mineral claim staking was down significantly in 1982 compared to previous years (Table 4B). By year end just under 160 thousand hectares of claims had been recorded compared to an average of 751 thousand during the previous 7 years. Claim staking in 1983 covered about twice the area as that staked in 1982.

Though more (91) Prospecting Permits were issued (Table 4A) 53 of these were for lands over which coal exploration leases had been granted last year to Petro Canada. Mineral exploration on these lands was undoubtably being carried on the back of the coal exploration. The 38 remaining permits are only 50% or less of the number of permits issued in the last 4 years.

TABLE 1-4A: PROSPECTING PERMITS ISSUED, 1976 TO 1983 IN VARIOUS GEOLOGICAL PROVINCES

	1976	1977	1978	1979	1980	1981	1982	1983
Arctic Islands	0	0	10	0	10	2	53	87
Cordilleran Province	1	0	5	1	11	9	12	7
Churchill Province	53	25	50	72	57	54	17	1
Bear Province	13	8	10	26	17	4	3	0
Slave Province	1	1	0	0	3	4	6	1
TOTALS	68	34	75	99	98	73	91	96

TABLE 1-4B: GROUND STAKED DURING THE YEARS 1976 TO 1983 IN VARIOUS GEOLOGICAL PROVINCES IN THOUSANDS OF HECTARES

	1976	1977	1978	1979	1980	1981	1982	1983
Arctic Islands	0.9	1.4	82.1	16.0	9.7	3.0	22.8	4.0
Keewatin Region (Churchill Province)	214.0	108.0	620.0	438.8	518.1	323.2	65.0	52.6
Churchill Province (West of Keewatin)	30.4	78.7	314.0	322.1	175.5	82.5	18.4	31.3
Slave Province	62.2	67.8	53.9	35.6	51.0	153.3	20.7	218.5
East Arm Subprovince	1.5	2.1	2.6	11.1	.02	11.2	.1	Nil
Bear Province	45.0	170.0	84.6	171.8	40.0	21.0	6.7	13.3
Pine Point District (Interior Plains)	49.2	5.6	255.3	131.9	13.5	2.5	0.7	.1
Cordilleran Province	8.2	19.9	19.0	14.4	25.2	12.9	25.0	11.6
TOTALS	411.4	453.5	1,431.5	1,141.7	832.9	609.6	159.4	331.4

Ninety-six Prospecting Permits were issued in 1983 (Table 4A). Of these, fifty-five were taken out in NTS 39 and 48 on the southeastern side of Ellesmere Island and in the Milne Inlet area of northern Baffin Island by 103912 Canada Inc. of Calgary. The Ellesmere Island Prospecting Permits cover mainly Precambrian Churchill Province rocks. The Baffin Prospecting Permits lie south and east of Nanisivik mine and cover Helikian platform formations in the Borden Trough and adjacent Churchill Province metamorphic-igneous rocks.

Trigg Woollett and Associates took a permit covering rocks at the contact of the Slave Province and the Goulburn Group south of Bathurst Inlet and Suncor took a permit (65 G/1 NE) immediately north of the Cullaton Lake gold mine.

Borealis Exploration took 8 permits in NTS 47A covering areas containing most of the Proterozoic iron formations in the western part of the Foxe Fold Belt (Churchill Province). Panarctic Oils Ltd obtained 24 permits covering Bear Province basaltic rocks in the Minto Arch of central Victoria Island. In the Cordillera, Hudson's Bay Mining and Smelting took 4 permits along the Liard River and Esso Resources took 4 permits in the Flat River area (95 E/2) covering Cretaceous intrusions cutting Ordivician to Silurian limestones.

The absence of new prospecting permit applications for the areas of uranium potential in the Baker-Thelon and Hornby basin underscores the shift of exploration to other commodities.

In 1982, forty-four Prospecting Permits lapsed or were relinquished and in 1983, sixty-nine more were given up. More than 70% of these were in areas where the target commodity was uranium.

Claim staking in 1983 increased significantly over 1982, from 160,000 Ha to 330,000 Ha (Table 4B). Most of this increase resulted from staking for gold in the Slave Province. There were increases in staking in the southeast Mackenzie (Churchill Province) and in the Bear Province also, but elsewhere staking declined.

In 1983 about 5,400 claims lapsed, reducing the claimed area by 700,000 Ha. Most of these were small, 500-m-square claims. New staking, mostly as large blocks, added approximately 330,000 Ha to the total for NWT, which on January 1, 1984, stood at 40,952 claims in good standing covering 3,114,606 hectares.

Currently available details on over 100 exploration projects are described in the following sections by the Geology Division's District Geologists, who also monitor producing and developing mines in their respective Districts, a function they share with the Staff Geologist who prepared the Chapter of this report recounting the production and developments at the 12 mines that produced during 1982 and 1983.

NORTHWEST TERRITORIES GEOLOGY DIVISION ACTIVITIES

The Northern Affairs Program of the Department of Indian and Northern Affairs administers the quasi-provincial responsibilities for resources, land, economic development, and environment in the Northwest Territories (NWT) that have been retained by the Federal Government. The NWT Geology Division, stationed in Yellowknife, administers the provincial level responsibilities for geology and for the mining and mineral exploration industries within the Territory.

The Geology Division also conducts numerous projects to investigate the mineral potential and geological framework of the NWT. Projects conducted by Geology Division staff average 10 to 15 a year. These may be under the direction of any of the geologists on staff. In the past few years most were conducted by geology graduate students employed only during the summer months.

A project geologist position was filled in 1983. The incumbent will in future years conduct mapping projects and assist monitoring those conducted by summer staff.

The Geology Division let 8 contracts to university geologists for geological investigations in 1982 and 15 in 1983 (Tables 5A and 5B). Products include maps and reports which are normally released as Economic Geology Series open files. Preliminary reports are published in the Geology Division's yearly Overview of Mining Exploration and Geology. Final reports are published in the recently initiated series "Contributions to the Geology of the Northwest Territories", are presented in theses at various universities or are published in journals and symposia volumes.

Table 5 lists the contracts issued in 1982 and 1983, the principal workers and the products expected or received.

During 1982, Geology Division survey crews continued mapping parts of the Yellowknife Volcanic Belt, producing 3 detailed (1:10,000 scale) maps covering the eastern part of Yellowknife Bay where most of the Duck Lake Volcanics are exposed. This crew then moved north and mapped 76 M/10 and M/15 on the Arctic Coast. Mapping was also begun farther west (76 M/11) on the Anialik River granite gneiss, which hosts extensive low-grade auriferous quartz veins.

C. Lord continued studies of placer gold deposits in the Liard River drainage system and W. Gibbins assisted Inuit carvers in soapstone evaluation. A new source of stone found in the Mary River area of Baffin Island (37 G/5) is now widely used in nearby communities. The good stone from this source has resulted in a multifold increase in the value of carvings produced in Pond Inlet (Gibbins, Personal Communication, 1984).

During 1983, the 30 field studies financially supported by the Geology Division were spread from the high Arctic (Baffin and Prince of Wales Island) to Norman Wells and Fort Smith. Expediting service was provided out of Yellowknife for 10 Geological Survey of Canada field crews and 24 university-sponsored projects supported by the Geology Division.

In the Keewatin, P.J. Laporte (District Geologist) continued mapping in the Judge Sissons-Schultz Lake area where Urangesellschaft has a large unconformity-related uranium deposit (Lone Gull) projected for production sometime in the next decade. Laporte also collected water samples around operating drill rigs as part of a study designed to provide base-line data on health hazards unique to uranium exploration. Professor J.A. Donaldson of Carleton University continued a study of regoliths along unconformities that have been targets of uranium exploration.

In the Arctic Islands, W.A. Gibbins (District Geologist) examined ultramafic rocks near the coast of Prince of Wales Island for carving stone. This is part of a long-term project to find carvable stone for the Inuit carving industry, which has a gross market value of 10 to 12 million dollars a year. With Dr. Hogarth (University of Ottawa), Gibbins began geological mapping of "Frobisher's Mine" in Frobisher Bay. A University of Alberta student (F.W. Nentwich) conducted field research on the Cape Crauford Formation of Northern Brodeur Peninsula (Baffin Island). The results of this will be a Ph.D. thesis and new insights into the Paleozoic of the eastern part of the Arctic Platform.

In the Cordillera, I. Muir of the University of Ottawa studied a Middle-Devonan sequence comprising the Hume, Hare Indian, Ramparts and Canol Formations that form shale platform/basin margin/basin sequences.

Two university projects and a joint Geological Survey-NAP mapping project were completed in part of the Churchill Structural Province northeast of Fort Smith. L. Patterson (University of Alberta) mapped high-grade metamorphic rocks in the Tsu Lake area. Geochemical and isotope studies to assist in interpreting the genesis and age of these rocks are underway. L. Aspler (Carleton University) completed a project designed to unravel the stratigraphy and structure of the Nonacho Group supracrustals within the mid-Proterozoic (Paleo-Helikian) Nonacho Basin. New 1:50,000 scale maps of the basin will be available in 1984 and a Ph.D. thesis on these strata is nearing completion. N. Culshaw (GSC) led a NAP Geology Division Mapping crew in the Rutledge Lake Area where Ni-Cu sulphide showings were discovered in 1982. A preliminary map showing the relationships of the granulite/upper amphibolite facies rocks of this complex area will be available in the near future.

Nearly half of all the projects supported by the Geology Division were done in the Archean Slave Structural Province, where approximately one half of all company-sponsored mineral exploration projects took place.

R. Meintzer (University of Manitoba) completed the field work component of an evaluation of the petrology, geochemistry and genesis of the rare-metal-bearing pegmatite dykes and related granites in the Yellowknife Supracrustal Basin.

Nine field projects are underway in or adjacent

TABLE 1-5A: GEOLOGICAL CONTRACTS 1982

1982 TOTAL DIRECT COST $50,700.00

PROJECT NAME	PRINCIPAL WORKER	UNIVERSITY	GEO-PROVINCE	PRODUCTS
Surficial Geology Glacial Lake Coppermine	D. St-Onge	Ottawa	Bear/Slave NTS 86	1:250 k Regional Map of Coppermine River Valley detailed studies, reports and thesis.
Mineralogical studies Big Spruce Lake Alkaline Complex	D. Smith	Alberta	Bear/Slave NTS 85 O/12	Detailed map of the complex, various papers on the geology, petrology, minerology and geochronology of this rare-earth bearing complex. Also Ph.D. Thesis.
Geological Mapping Clan Lake Volcanic Complex	W.K. Fyson	Ottawa	Slave NTS 85 J/16	Detailed 1:1 k maps of the Clan Lake Volcanic complex reports and MSc thesis. Also article for Yellowknife Guide Book.
Detailed Geological Mapping Point Lake (Keskarrah Bay area)	T. Rivers	Memorial	Slave NTS part of 86/H	Detailed map, studies of structure metamorphic petrology and geological evolution.
Geological Studies Yellowknife Volcanic Belt	H. Helmstaedt	Queen's	Slave NTS 85 J,8, 9, 16	Detailed mapping and re-mapping parts of Yellowknife Volcanic Belt maps of areas of belt not mapped in detail. New 1:10 k maps. New 1:50 k maps Yellowknife Bay, Prosperous Lake and Quyta Lake.
Geological mapping Dumas Lake area and Geo-chronological studies	R. VanSchmus	Kansas	Bear NTS 86/K	Geological Map and Geo-chronology of Bear Province.
Sedimentological and paleoecologic study Kee Scarp Formation. Examination of Canol Imperial and Hare Indian Formations.	O. Dixon	Ottawa	Cordillera	Reports, sections and Ph.D. thesis.

to the Yellowknife Volcanic Belt, host to the Con and Giant Gold mines. H. Helmstaedt (Queen's University) is re-evaluating existing geological maps of the belt and preparing a new unified set of detailed maps (1:15,000 scale) and as well a new set of 1:50,000 scale maps of Yellowknife Bay, Prosperous Lake and Quyta Lake areas (NTS 85 J/8,9 and 16). W.K. Fyson (University of Ottawa) continued a long-term project to unravel the complex structural history of the Slave Structural Province, particulrly the supracrustal component, of the Yellowknife Supergroup. G. Bailey (Queen's University) began a study of the Jackson Lake Formation, probably the youngest sedimentary unit in the Yellowknife Volcanic Belt. J.A. Brophy (NAP, Geology) continued detailed mapping of a small area of complex volcanic rocks that represent a lower part of the Kam Formation. W.A. Padgham reassessed exposures believed to represent the topmost part of that formation (the Giant Section) just east of the Giant Mine Plant. He also explored parts of the West Mirage Islands previously identified as representatives of the basaltic Kam Formation, but now considered part of the overlying Banting Formation, which is considerably more felsic. A.M. Goodwin (University of Toronto) began a geochemical study of Slave Province volcanic rocks by studying and sampling the Kam Formation of the Yellowknife Volcanic Belt.

G. Yeo (NAP, Project Geologist) headed a large field crew that completed reconnaissance in the Quyta Lake area, which contains the northern end of the Yellowknife Volcanic Belt and more felsic outliers such as the Clan Lake volcanic pile, whose relationship to the Yellowknife Belt is of considerable interest. Yeo also mapped part of the Reid-Hidden Lake area, proposed site of a territorial wilderness park or preserve and locale of numerous gold and rare metal properties.

Farther from Yellowknife in the Slave Province, R. St. J. Lambert (University of Alberta) sampled volcanic belts in the southeastern part of the province to further an assessment of the geochemical evolution of Archean crust.

G. Yeo (NAP, Geology), assisted by a crew of 6 graduate and 4 undergraduate students, mapped most of the West half of the Hepburn Island Area (NTS 76 M).

STATUS
Part of long term project to investigate glacial and post-glacial sediments on Northern Slave and Bear Provinces.
Field work completed. Lab work well in hand, various reports and papers issued. Ph.D. 1986.
Field work completed. Preliminary maps and papers published. MSc thesis fall 1984.
Maps and reports published. MSc expected fall 1984.
Work continuing most areas of belt now mapped in detail and preliminary maps published. New detailed compilation maps are being prepared. First releases expected early 1985. Numerous auxillary studies have developed from this overall project begun by Department staff in 1975.
Maps and reports have been produced.
Preliminary reports published.

Preliminary maps for 76 M/3, 4, 5, 6 and 12 will be released early in 1984. In the same general area W.A. Padgham, V. Jackson and B. Fischer completed a reconnaissance of the Anialik River granite gneiss, host to the Arcadia gold-bearing quartz veins. G. Yeo, J. Crux and C. Relf mapped the Canoe Lake Volcanics (76 M/3) in detail. This will be the basis of a B.Sc. thesis for Relf at Queen's University. Additional field work is planned in the Anialik River granite gneiss and adjacent parts of the Hepburn Island area in 1984.

Geological work in six areas of the Bear Structural Province was assisted. J. Patterson (GSC and Virginia Polytech) was assisted in studies in the East Arm of Great Slave Lake and in the western part of the Goulburn Group of the Kilohigok Basin. K. Pelletier (Ottawa University) began mapping the Ellington Lake area (86 F/3), concentrating on the supracrustal succession. Farther north, S. Bowring (University of Kansas) continued studies in the Adam, Benoit, Dumas, Kamut Lakes area along the Wopmay suture. He collected copious volumes of material for zircon dating, part of a joint project to date the development of the Wopmay Orogen. K. Munro (Carleton University) worked from Bowring's camp to map volcanics in the Dumas Group. Professor D. St-Onge (Terrain Sciences, GSC and University of Ottawa) studied the surficial geology of Glacial Lake Coppermine and, with A. Mercier (University of Ottawa) the glacial deposits of the Richardson River Valley. A crew of American researchers, including Neil Irvine of the United States Geological Survey and American university personel, were assisted in a study of the Muskox Intrusion.

Professor D. Smith (University of Alberta) began a study of the mineralogy and chemistry of the Thor Lake Property rare metal-bearing deposits in the Aphebian Blatchford Lake alkaline intrusive complex that lies just north of Hearne Channel on Great Slave Lake. The parameters of this study have not yet been defined.

A bald eagle research project led by Professor R. McLelland of the University of Montana was assisted for the third and final year. This project tracks eagles from their fall fishing grounds on the Snake River, to their wintering areas in various parts of the western United States and to their nesting sites. Geology became involved when aircraft were found necessary to track the eagle's tail-borne radio transmitters because they had flown into the roadless northern areas beyond the range of automobile-borne tracking devices.

A program was launched in September 1983 to obtain drill cores representative of typical ore bodies from each of the operating mines in NWT. These cores will be filed in the core library to provide a permanent, publicly available record of NWT orebodies. Response from operating mines has been excellent and, when completed, we should have a collection of considerable scientific value. It is also planned to obtain cores representative of ore bodies that supported mining in the past. Cores have also been collected from a number of properties that have recently been drilled, and a number of properties drilled years ago were visited to see if any drill core was salvageable. Success in the latter case has been minimal, but this will be pursued in future years.

Report Organization

The organization of this Mineral Industry Report is similar to that of previous ones, except that: 1)

TABLE 1-5B: GEOLOGICAL CONTRACTS 1983

1983 TOTAL DIRECT COST $93,800.00

PROJECT NAME	PRINCIPAL WORKER	UNIVERSITY	GEO-PROVINCE	PRODUCTS
Structure of Slave Province	W.K. Fyson	Ottawa	Slave	Studies and papers contributing to understanding of Slave Structure.
Structure and Evolution of Southern Slave Province.	R. St. J. Lambert	Alberta	Slave	Contributions to understanding of Slave Structure, evolution.
Geological Studies Yellowknife Volcanic Belt	H. Helmstaedt	Queen's	Slave NST 85/J 8,9,16	Detailed mapping and remapping parts of Yellowknife Volcanic Belt. Maps of areas of belt not mapped in detail. New 1:10 k maps. New 1:50 k maps Yellowknife Bay, Prosperous Lake and Quyta Lake.
Study of Pegmatites Yellowknife Supracrustal Basin	P. Cerny	Manitoba	Slave NST 85 NE	Preliminary reports Ph.D. Thesis and Final memoir contribution to the genesis of Yellowknife basin rare element pegmatites.
Blatchford Lake Alkaline Complex Preliminary investigation	D. Smith	Alberta	Slave/Bear NTS 85I/	Proposal for economically oriented minerological research.
Petrogenesis of Slave Province Volcanic Belts	A.M. Goodwin	Toronto	Slave	Papers on petrogenesis of Slave Volcanic rocks. Thesis relations to ore deposits and comparisons to Superior Provinces.
Geology and Geo-chemistry of the Tsu Lake area	D. Smith	Alberta	Churchill NTS 75D/	Papers analysing high grade rocks and evolution of part of the Churchill Structural Province: Ph.D. Thesis.
Structure, Sedimentology evolution and mineral potential of the Nonacho Basin	J.A. Donaldson	Carleton	Churchill NTS 75/SW	Various papers and detailed maps on Nonacho Basin plus a 1:250,000 k compilation and Ph.D. Thesis.
Stratigraphy and Sedimentology of Thelon Formation regoliths and relations to Uranium Mineralization	J.A. Donaldson	Carleton	Churchill	M.Sc. Thesis, various papers (Joint with GSC).
Mapping Quaternary deposits, Richardson River Basin	D. St-Onge	Ottawa	Slave/Bear NTS 86	1:250 k Regional map of Coppermine River Valley. Detailed studies, reports and thesis.
Detailed Geological mapping Ellington Lake area	J. Moore	Carleton	Bear	Detailed geological maps and studies of Bear Province Volcanics and Volcaniclastics. M.Sc. Thesis.
Geochronological studies Slave and Bear plus detailed mapping in Dumas Lake area	R. VanSchmus	Kansas	Bear NTS 86K	Geological map and Geo-chronology of Bear Province.
Geological Mapping and Sedimentology of the Cape Crawford Formation on the Brodeur Peninsula	B. Jones	Alberta	Arctic Platform NTS 48 SW	Sedimentological studies, economic evaluation. Maps and section Ph.D. Thesis.
Mapping of Frobisher's Mine, Frobisher Bay	D. Hogarth	Ottawa	Archeological Geology NTS 25I/14	Evaluation of Frobisher's Mining Ventures, Baffin Island.

the report on exploration in the Nahanni District has been moved from Chapter 8 to Chapter 3 and, 2) under the heading "REFERENCES" in Chapters 3 to 8 is included the document number(s) of the assessment report(s) that was used as source material for the write-ups. These document numbers are given to documents when they are indexed for inclusion in the computerized Geoscan-Minisis System.

The Geology Division Archive has been reorganized according to these numbers in place of the National Topographic System (NTS) method used prior to 1984. This has required a major reorganization and review of all assessment documents and creation of a NTS cross reference system. The new system will permit far better control and better maintenance of the archival material.

Division Publications

The Geology Division produces a dozen releases in the EGS series each year. A list of these in chronological order of release is included on the next page.

A number of releases in preparation in this

STATUS
Numerous reports published.
Numerous reports published.
Work continuing most areas of belt now mapped in detail and preliminary maps published. New detailed compilation maps are being prepared. First releases expected early 1985. Numerous auxillary studies have developed from this overall project begun by Department Staff in 1975.
Preliminary papers published. Various thesis in preparation.
Program recorded and a study is in progress.
Sampling of Yellowknife Volcanic Belt completed and geochemical done.
Field and laboratory work complete. Thesis expected fall 1984.
Field work completed. Thesis expected fall 1984. Maps 84/85.
All phases contemplated completed. Future work possible.
Part of long term project to investigate glacial and post-glacial sediments on Northern Slave and Bear Provinces.
Field work almost completed (as of 1984). Map expected 1984 or Spring 1985. Thesis 1986.
A number of maps and reports have been produced.
Field work completed (1984). Preliminary papers submitted. Work continues.
Papers and reports on one of First NWT Mining ventures.

series include maps displaying the geology of the proterozoic Nonacho Basin by L. Aspler. These will include a 1:250,000 compillation of the whole basin, and more detailed (1:50,000) maps of the basin.

Another set of maps showing the regional geology of the Hornby Basin including the Dismal Lake (86N) area by Ross, Kierans and Donaldson is nearly ready.

A set of compilations of the geology of the Yellowknife Volcanic Belt, parts of 85 J/8, 9 and 16, are in preparation. These will be produced at 1:10,000 scale and later compiled at 1:50,000 as part of new maps for Yellowknife Bay, (J/8), Prosperous Lake (J/9) and Quyta Lake (J/16).

LIST OF PUBLICATIONS AVAILABLE
FROM THE GEOLOGY DIVISION
NORTHERN AFFAIRS PROGRAM
BOX 1500
YELLOWKNIFE, N.W.T.
X1A-2R3

UPDATE: OCT 17, 1984

Please note: Orders must be accompanied by payment: Cheques or Money orders must be payable to The Receiver General of Canada.

Mineral Industry Reports (MIR)

MIR 1969-70 ($2.00)
Vol. 2, Northwest Territories, east of 104° W longitude; by P.J. Laporte; DIAND, 1974.

MIR 1969-70 (n/c)
Vol. 3, Northwest Territories west of 104° W longitude; by Theresa Padgham, T.W. Caine, D.R. Hughes, C.W. Jefferson, M.W. Kennedy and J.D. Murphy; DIAND, EGS 1978-6.

MIR 1971-72 ($2.50)
Vol. 2, Northwest Territories, east of 104 W longitude; by P.J. Laporte; DIAND, 1974.

MIR 1971-72 ($3.00)
Vol. 3, Northwest Territories, west of 104 longitude; by W.A. Padgham, M.M. Kennedy, C.W. Jefferson, D.R. Hughes and J.D. Murphy; DIAND, EGS 1975-8.

MIR 1973 ($3.75)
Northwest Territories; by W.A. Padgham, J.B.Seaton, P.J. Laporte and J.D. Murphy; DIAND ,EGS 1976-9.

MIR 1974 ($4.50)
Northwest Territories; by W.A. Gibbins, J.B. Seaton, P.J. Laporte, J.D. Murphy, E.J. Hurdle and W.A. Padgham; DIAND, EGS 1977-5.

MIR 1975 ($6.00)
Northwest Territories; by P.J. Laporte, W.A. Gibbins, E.J. Hurdle, C.C. Lord, W.A. Padgham and J.B. Seaton; DIAND, EGS 1978-5.

MIR 1976 (n/c)
Northwest Territories; by C.C. Lord, P.J. Laporte, W.A. Gibbins, E.J. Hurdle, J.B. Seaton and W.A. Padgham; DIAND, EGS 1978-11.

MIR 1977 (n/c)
Northwest Territories; by C.C. Lord, P.J. Laporte, W.A. Gibbins, J.B. Seaton, J.A. Goodwin and W.A. Padgham; DIAND, EGS 1981-11.

MIR 1978 ($7.50)
Northwest Territories; by J.A. Goodwin, P.J. Laporte, C.C. Lord, W.A. Gibbins, J.B. Seaton and W.A. Padgham; DIAND, EGS 1983-2.

MIR 1979 ($7.50)
Northwest Territories; by J.A. Brophy, W.A. Gibbins, P.J. Laporte, C.C. Lord, W.A. Padgham and J.B. Seaton; DIAND, EGS 1983-9.

MIR 1980-81 ($10.00)
Northwest Territories; by J.A. Brophy, W.A. Gibbins, P.J. Laporte, C.C. Lord, W.A. Padgham and J.B. Seaton; DIAND, EGS 1984-5.

Exploration Overviews (no charge)

1974
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1975
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1976
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1977
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1978
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1979
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1980
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1981
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1982
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1983
Mining, Exploration and Geological Investigations, Northwest Territories; by the staff of the Geology Division and others, DIAND, Yellowknife, NWT.

1984
Mining, Exploration and Geological Investigations, Northwest Territories; by the staff of the Geology Division and others, DIAND, Yellowknife, NWT.

MINERAL OVERLAY MAPS

Charges: .0015 mylar copies, $2.50/sheet; paper copies, $1.00/sheet.

These maps are designed as overlays to Geological Survey of Canada geology maps ("A" series and Preliminary series) and 1:250,000 Topographic maps where geology maps are unavailable.

All mineral showings recorded in the Northwest Territories at the time of compilation have been plotted on overlays.

48A (1235A)
55E (9-1970)
55F (10-1970)
55K (6-1972)
55L (1285A)
65C (24-1970)
65H/10,11,14,15 (P. 69-52)
65H (15-1970)
65I (16-1970)
65L (topo)
66M (topo)
75A (1199A)
75C (1203A)
75D (607A)
75E (525A)
75F, G west 1/2 (1281A)
75K (1123A)
75L (122A)
75M (738A)
75M/2 (1198A)
75M,75O (1024A)
75N (1013A)
75O (topo)
76B (topo)
76C (1031A)
76D (977A)
76D (1025A)
76E (topo)
76E,86H (8-1966)
76E/11,14 (12-1965)
76E/14 (10-1966)
76F (topo)
76G (1267A)
76H (topo)
76I (topo)
76J (topo)
76K (topo)
76L (topo)
76M (topo)
76O (topo)
76P (topo)
77A (topo)
85G (topo)
85H (50-28A)
85I (581A)
85I/14 (645A)
85J (topo)
85J/8 (709A)
85J/9 (868A)
85K (topo)
85N (topo)
85N/7 (1230A)
85N,O (690A)
85O (topo)
85O (49-14)
85O/14 (1021A)
85O,P (1017A)
85P (51-8)
85P/3 (644A)
86A (1219A)
86B/3 (1022A)
86B/6 (1023A)
86B,C (697A)
86C (1224A)
86D (topo)
86E (topo)
86F (1014A)
86G (topo)
86H (topo)
86I (topo)
86J (topo)
86K (topo)
86K/15 (1011A)
86L (topo)
86M (topo)
86N (1338A)
86O (1337A)
86P (topo)
86C,D,E,F (5-1971)
95E (1313A)
95F (22-1960)
95J (22-1961)
95M (1315A)
95O (1373A)
96A,B,G,H
105I (8-1967)
105P (1333A)
106A (topo)
106B (topo)
106C (topo)
106F (topo)

Open File Geological Maps and Reports on the NWT

(by NWT Geology Division)

G.S.C. Open File 129 ($15.00)
Lake sediment geochem. sampling of the Yellowknife, Indin Lake and portions of Cameron River and Beaulieu River greenstone belts; D. Nickerson (85B/6; 85I/10,11,14,15,16; 85J/8,9; 85 O/14; 86P/1,2,8). 14 maps and 1 text.

G.S.C. Open File 135 ($5.00)
Geology of Camsell River silver district, NTS 86E/9; by R.M. Shegelski and J.D. Murphy. 2 maps and text.

G.S.C. Open File 179 ($2.00)
Preliminary geological map Rankin Inlet, NTS 55K/16; by P.J. Laporte and S.K. Frape. 1 map.

G.S.C. Open File 199 ($2.00)
Geological map of White Eagle Falls area, NTS 86F/12; by W.A. Padgham, R.J. Shegelski, J.D. Murphy and C.W. Jefferson. 1 map.

G.S.C. Open File 208 ($2.00)
Geological map of High Lake area, NTS 76M/7; by W.A. Padgham, R.J. Shegelski, D.R. Hughes and C.W. Jefferson. 1 map.

G.S.C. Open File 239 ($4.00)
Geology of two base metal deposits in the Slave Structural Province (High Lake copper-zinc deposit, NTS 76M/7, and Indian Mountain Lake zinc-lead-silver-copper deposit NTS 75M/2); by W.L. Johnson. 2 maps and text.

EGS 1975-1, 1975-2, 1975-3 ($3.00/map)
Preliminary geology maps of Hackett River, 76G/13, G/12, G/5 (part), scale 1:31,680; by W.A. Padgham, M.P.D. Byran, C.W. Jefferson, E.A. Ronayne and V.Z. Sterenberg.

EGS 1976-4, 1976-5, 1976-6, 1976-7, 1976-8 ($3.00/map)
Preliminary geology maps of Hackett River, 76K/2, F/9, K/1, F/15, F/16, scale 1:31,680; by C.W. Jefferson, W.A. Padgham, M.P.D. Byran, R.J. Shegelski, E.A. Ronayne, H. Vandor and L. Thorstad.

EGS 1976-1 see 1981-4

EGS 1976-2 ($3.00)
Preliminary geology map of Ferguson Lake, 65I/15, scale 1:31,680; by K.R. Barrett, P.J. Laporte and S.R. Leggett.

EGS 1976-3 ($3.00)
Preliminary geology report of Baker Lake, 56D/2 (part), D/7 (part), 1 text, surficial and bedrock geology maps, scales 1:15,840 and 1:1,000 by K.R. Barrett, P.J. Laporte and S.R. Leggett.

EGS 1976-17, 1976-18 ($3.00/map)
Preliminary geology maps of Takijug Lake, 86I/1 and 86I/2, scale 1:31,680; by R.S. Hyde, H.A. McLeod, B.T. Scribbins and S. Taylor.

EGS 1978-1 ($3.00)
Preliminary geology map of Amer Lake, 66H/7, scale 1:31,680; by P.J. Laporte, K.R. Barrett and G. Schwab.

EGS 1978-2 ($8.00)
1977 Exploration activity in the Keewatin District. One index map and eight maps outlining the geology and property ownership in seven active areas of the Keewatin. Prepared by P.J. Laporte for presentation at the Dec./77 Geoscience Forum in Yellowknife.

EGS 1978-4 ($3.00/map)
Preliminary geology maps of 86H/14,15,16. District of Mackenzie, NWT, scale 1:31,680; by A.F.S. Bau, L.B. Aspler and E.J. Hurdle.

EGS 1978-8 ($3.00) (Also appears in MIR-76, EGS 1978-11)
Surficial geology, permafrost and related engineering problems, Yellowknife, 85J/8; 1 map, scale 1:6,000; text by L.B. Aspler.

EGS 1979-2 a,b,c ($3.00/map)
Preliminary geology maps of 86H/9,10,11; scale 1:31,680; by A.F.S. Bau, S.P. Goff, M.J. Yakey.

EGS 1979-3 ($3.00)
Litho-stratigraphic map of northeast half of Great Bear Lake, 86K/4,5, scale 1:50,000; by R.S. Hildebrand.

EGS 1979-7 ($3.00)
Preliminary geology map of 76D/3,6; Courageous Lake, scale 1:12,000; by H. Dillon-Leitch.

EGS 1979-9 ($3.00)
Preliminary geology map of the southern end of the Yellowknife Greenstone Belt, 85J/7 (part), J/8 (part), scale 1:7,500; by H. Helmstaedt, J.A. Goodwin, J.G. Patterson and J. King.

EGS 1979-10 ($3.00)
Preliminary geology map of the northern end of the Yellowknife Greenstone Belt, 85J/9, scale 1:8,500; compilation of 1975, 1976, 1977 and 1978 mapping by DIAND Geology crews; L.M. Hauer.

EGS 1979-11 ($3.00)
Preliminary geology map of eastern Point Lake, 86H/1,2 (part), scale 1:31,680; by J.A. Goodwin, H. Helmstaedt, J. King, R. Boodle and S. Pinard.

EGS 1979-12 see 1980-9

EGS 1980-1 ($3.00)
Petrographic report of rocks in the Amer Lake area, District of Keewatin, 66H/10 and 66H/7; by J.G. Patterson.

EGS 1980-2 ($9.50)
Stratigraphy, Sedimentation & Tectonism in the Hornby Bay and Dismal Lakes Groups, Proterozoic, NWT, 86J,K,L,M,N,O,;by C. Kerans, G.M. Ross and J.A. Donaldson, 25 page report including 24 figures, excerpt from 1977 M.I.R.

EGS 1980-5 ($4.00)
Preliminary geology map of Banting and Walsh Lakes area, 85J/9, scale 1"=800'; by H. Helmstaedt, J. King, and R. Boodle.

EGS 1980-9 ($4.00)
Preliminary geology map, Eastern end of the Amer Belt, NTS 66H/7,8,9,10, scale 1:31,680, update of EGS 1979-12; by J.G. Patterson from mapping by K. Barrett in 1977 and J.G. Patterson in 1979 and 1980. 2 maps.

EGS 1980-10 ($8.00)
Preliminary geology map of eastern Point Lake, 86H/7,8 (part), scale 1:31,680; by J.E. King, R. Boodle and M.R. St-Onge.

EGS 1981-1 ($3.00) (Superseded by G.S.C. open file 930)
Preliminary geology map of Rainy Lake and White Eagle Falls, NTS 86E/9, scale 1:50,000; by R.S. Hildebrand.

EGS 1981-2 ($4.00)
Proposed Mineral Exploration Activity, District of Keewatin, scale 1:1,000,000; by P.J. Laporte.

EGS 1981-3 ($5.00)
Geology of the Walsh Lake area, 85J/9, scale 1:10,000 by R.M. Easton and V. Jackson.

EGS 1981-4 ($8.00)
Geology of the Heninga-Turquetil-Carr Lakes area, Northwest Territories, 2 maps, scale 1:31,680 covering 65H/16, 55E/13, 55L/4 and 65I/1; by P.J. Laporte, K.R. Barrett, S.R. Leggett. (This open file replaces 1976-1).

EGS 1981-5 ($8.00)
Geology of the Western Part of Point Lake, NTS 86H, all of H/4,5 and the west halves H/3,6; scale 1:30,000, 4 maps; by R.M. Easton, R.L. Boodle, L. Zalusky, G. Eiche and D. McKinnon.

EGS 1982-1 ($5.00)
Preliminary Geology maps of Kamut and Adams Lakes area in the North Central Wopmay Orogen, District of Mackenzie, NWT 86K/8,9, scale 1:25,000; by S.A. Bowring.

EGS 1982-2 ($4.00)
Proposed Mineral Exploration Activity, District of Keewatin, scale 1:1,000,000; by P.J. Laporte.

EGS 1982-3 ($5.00)
Preliminary Geology map of Taltheilei Narrows 75L/12 - Point Busse area, scale 1:14,000; by Karen S. Pelletier.

EGS 1982-4 ($5.00)
Geology of Keskarrah Bay area, Slave Structural Province, District of Mackenzie, 86H/6,7 NWT; by Valerie Jackson. 1 map.

EGS 1982-5 ($5.00/map)
Geology of the East side of Yellowknife Bay, 85J/8,9 scale 1:10,000; by R.M. Easton, C. Ellis, H. Helmstaedt, V. Jackson, B. O'Hearn and M. Dean. 3 maps and notes.

EGS 1982-6 ($8.00)
Geology of the Typhoon Point map area, High Lake Greenstone Belt, District of Mackenzie, NWT, 76M/10, 76M/15 (south half), scale 1:31,680; by R.M. Easton, C. Ellis, M. Dean and G. Bailey.

EGS 1982-7 ($5.00) (See also EGS 1983-6)
Preliminary Geology Compilation of the Hepburn Island map area, 76M scale 1:125,000; by R.M. Easton.

EGS 1983-1 ($5.00)
Proposed Mineral Exploration Activity, District of Keewatin, scale 1:1,000,000; by P.J. Laporte.

EGS 1983-3 ($5.00)
A compilation of isotopic dates for the Slave-Structural Province, report by R.M. Easton. 2 maps.

EGS 1983-4 ($15.00)
Geology of the Rankin Inlet area, NTS 55/K, by P.J. Laporte, S.K. Frape and S.R. Leggett. 4 maps and a 50 page report.

EGS 1983-5 ($5.00 ea./$15.00 set)
Geology of a Volcanic Pile at Clan Lake, NTS 85I/13, scale 1:10,000; by E. Hurdle. 3 maps and notes.

EGS 1983-6 ($4.00)
Preliminary geological compilation of western Hepburn Island map area, NWT; NTS 76M/west 1/2, scale 1:125,000; by G.M. Yeo. 1 map.

EGS 1983-7 ($3.00)
Preliminary Geological Compilation of Quyta Lake area, NWT; parts of NTS 85J/9,16, scale 1:50,000; by G.M. Yeo. 1 map and notes.

EGS 1983-8 ($24.00 set, $4.00 each)
Preliminary geology of western Hepburn Island map area, NWT; NWT 76M/west 1/2, scale 1:31,680; by G.M. Yeo, G. Bailey, J. Crux, B. Fischer, V. Jackson, C. Relf and J. Wahlroth. 6 maps.

EGS 1983-10 (N/C)
A Layperson's Geological Guide to the Long Lake Park Hike Trail. Designed for the non-geologist and illustrated with maps and sections, this report is an introduction to the geology of Long Lake Park (part of NTS 85J/8) and a geological guide to a four-km park trail that traverses the lower part of the Kam Formation; by J.A. Brophy.

EGS 1983-11 (N/C)
Gold Deposits of the Northwest Territories; Classes, styles, genesis, exploration method and success probabilities; by W.A. Padgham.

EGS 1984-1 ($5.00)
Proposed Mineral Exploration Activity, District of Keewatin, scale 1:1,000,000; by P.J. Laporte. 1 map.

EGS 1984-2 ($5.00)
Index to Geological, Geochemical and Surficial Geology reports, Keewatin District; by P.J. Laporte. 1 map and 1 report.

EGS 1984-3 ($5.00)
Preliminary Geological Map of Rutledge Lake, NTS 75E/10, scale 1:50,000 by N.G. Culshaw. 1 map and notes.

EGS 1984-4 ($10.00)
Geology of the Courageous Lake-Mackay Lake Greenstone Belt, NWT; parts of NTS 75M/14,15 and 76D/2,3,5,6, scale 1:24,000; by H.C.H. Dillon-Leitch. 4 maps adjoin GSC map 1024A.

EGS 1984-6 ($5.00)
Contributions to the Geology of the Northwest Territories Vol. 1; editor J.A. Brophy.

MISCELLANEOUS MAPS AND REPORTS:

The Geochemistry of Lake Sediments in the Yellowknife River Area, NWT; by Robert G. Jackson, Department of Geological Sciences Queen's University May 1973 ($6.00).

Coal Deposits in the Arctic Archipelago, NWT; by T.W. Caine, 1973 ($2.00).

Soapstone Deposits of the NWT; by J.D.Murphy, 1973 ($5.00).

Property ownership maps showing all mineral claims in good standing and prospecting permit areas in the NWT plotted on 1:250,000 topographic maps. Lists of owners, staking dates included. Order by NTS map number ($1.00/sheet).

Coal Occurrences of the Western Mainland of the NWT; by J.A. Goodwin, 1978 ($2.00).

THE FOLLOWING PAPERS ARE AVAILABLE FREE OF CHARGE:

A survey of the uranium content of surface waters at two drill sites: Thirty Mile Lake and Long Lake, District of Keewatin, NWT; by P.J. Laporte, R.N. Soniassy and J.A. Brophy.

Mining Developments, Mineral Inventory and Metallogenic Models: Arctic Regions, NWT, Canada; by Walter A. Gibbins, 1982; *in* Arctic Geology and Geophysics Proceedings, 3rd International Symposium on Arctic Geology; Can. Soc. Pet. Geol., Mem. 8.

Copies of these manuscripts can be examined at the Geology Office, DIAND Yellowknife:

Exploration for lead-zinc in the Selwyn and Mackenzie Mountains, Yukon and Northwest Territories; by J.D. Murphy and W.D. Sinclair. Paper presented at the Prospectors and Developers Convention, Toronto, Ontario, 1974.

Mineral potential of the Northwest Territories; by W.A. Padgham. Published in the Geology of the Canadian Arctic. Editors: J.D. Aitken and D.J. Glass. Special publication C.S.P.G. and G.A.C., 1974.

1981 Index to mining assessment reports

Lead-Zinc Mineralization in the Central Dolomite Belt of the Lower Cambrian Sekwi Formation; by W.J. Crawford. Paper presented at Geoscience Forum, Yellowknife, NWT, 1974.

Lake sediment geochemistry as a guide to detection of massive sulphide deposits in the southern Slave Province; by R. Jackson and I. Nichol. Paper presented at the Geoscience Forum, Yellowknife, NWT, 1974.

Carbonate hosted lead-zinc deposits of the Northwest Territories; by W.A. Gibbins. Presented at the First Annual CIM District 4 meeting, Thunder Bay, Ontario, 1976.

An Archean Ignimbrite at Yellowknife and its Relationship to the Kam Formation Basalts; Precambrian Research, 12 (1980), p. 99-113; by W.A. Padgham.

Archean Crustal Evolution-A Glimpse From The Slave Province; by W.A. Padgham; Archean Geology, Spec. Publ. Geol. Soc. Aust. 7 (1981), p. 99-110.

* Gold Deposits of the Northwest Territories; by W.A.Padgham. (174).

* Geology of the Southwest End of the Yellowknife Greenstone Belt; by H. Helmstaedt, J. King, J.A. Goodwin and J.G.Patterson. (223).

* Gold and Precambrian Iron Formation in the Northwest Territories; by W.A. Gibbins. (258).

* Geology of the Yellowknife Volcanic Belt; by W.A. Padgham. (288).

* B-Zone Deposit, Cullaton Lake, District of Keewatin, Northwest Territories; by Charles E. Page. (323).

Sandstone, Stratigraphy and Uranium Potential of the Eastern Hornby Bay Basin; by G.M. Yeo; from Mineral Industry Report 1977, EGS 1981-11.

A Preliminary Analysis of the Mountain and Keele Diatremes NWT; by A.E. Oldershaw; from Mineral Industry Report 1977, EGS 1981-11.

Lead Isotope Study of Carbonate-hosted Pb-Zn Deposits in and near the Mackenzie Mountains, Northern Canadian Cordillera; by C.I. Godwin, A.J. Sinclair, Barry D. Ryan and W.F. Slawson; from Mineral Industry Report 1977, EGS 1981-11.

Mississippi Valley Type Lead-Zinc Districts of Northern Canada; by W.A. Gibbins; *in* Int. Conference on MVT lead-zinc deposits, *Proceedings*, Univ. of Missouri, Rolla, Missouri.

NWT Mineral Potential map plus list of deposits and names of producing mines.

* Reprints from the "Proceeding of the Gold Workshop, Yellowknife, NWT, Dec. 3-7, 1979; R.D. Morton, ed., 1981." A second printing of this volume should be available in the near future.

** Sedimentology of the Snowblind Bay Formation, a Preliminary Report; by I. Muir and B.R. Rust.

** Stratigraphy of an Upper Silurian Carbonate Shelf Sequence on Cornwallis and nearby Islands; by J. Packard and O.A. Dixon.

** Geological Studies of Rare-Element Pegmatites in the Yellowknife Basin, NWT; by R.E. Meintzer and P. Cerny.

** Progress Report on Geological Studies in the Great Bear Lake area; by W.R. VanSchmus and S.A. Bowring.

** Magnetite-Associated Uranium Deposits of the Wopmay Fault; by R. Miller.

** Preliminary Report on the Clan Lake Volcanic Complex; by E. Hurdle.

** Preliminary Report on the Keskarrah Bay map area, Slave Structural Province, NWT; by V. Jackson.

Progress Report on Placer Gold in the Liard River, NWT; by C.Lord.

** Reprints from the "Mineral Industry Report" 1978, EGS 1983-2.

Mineral Potential of the Cordilleran Region, NWT (1978) by C.C. Lord.

Mineral Potential and Geology of Bear Slave Structural Provinces, District of Mackenzie.

Mineral Potential and Geology of S.E. Barren Grounds, parts of District of Keewatin.

Mines and Minerals Activities, North of 60. Published yearly and includes summaries of exploration and mining activities for Yukon and Northwest Territories.

NOTE: GSC memoirs, bulletins and papers are available for viewing at the Geology Division's Archive on the Fourth Floor of the Bellanca Building. GSC open-file releases pertaining to the NWT are available for purchase.

Chapter 2: OPERATING MINES

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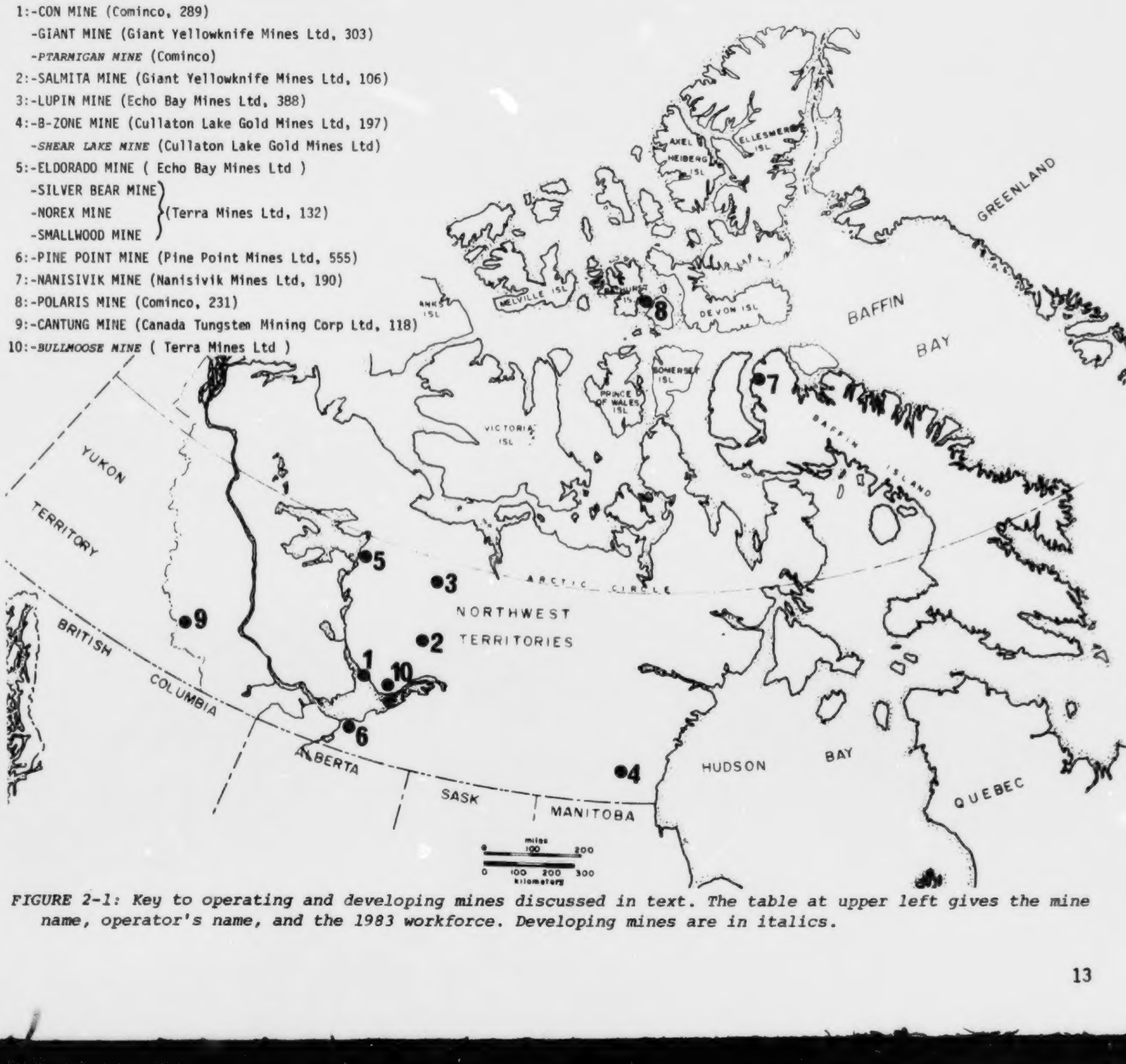
INTRODUCTION

Two new mines, Lupin (gold) and Smallwood (silver), came on stream in 1982 to join the ten other mines that operated in the NWT that year (Fig. 2-1): Con, Giant and B-Zone (gold); Eldorado, Silver Bear and Norex (silver); Pine Point, Polaris and Nanisivik (zinc-lead) and Cantung (tungsten). The closure of the Eldorado Mine in 1982 was balanced by the opening of the Salmita gold mine in 1983, thus maintaining the number of mines at 12 and the number of mills at 10 (ores from Silver Bear, Norex and Smallwood are treated at a common mill). Summary information on these operating mines is given in Table 2-1, and metal production for the years 1981 to 1983 is tabulated in Table 2-2. As in previous years, five commodities (gold, silver, zinc, lead and tungsten) accounted for over 99% of the value of NWT metal production in 1982 and 1983.

1982 OVERVIEW

Although prices of the five major commodities mined in the NWT were 10% to 26% lower than those of the previous year (Table 2-3), the value of metal output in 1982 was a record 595 million dollars, 22% more than that of 1981 (Table 2-2). This new record, set despite a climate of economic recession, can be attributed to output from Polaris, B-Zone, Lupin and Cantung. Polaris' first year of full production bolstered lead and zinc output by about 30%.


1:-CON MINE (Cominco, 289)
-GIANT MINE (Giant Yellowknife Mines Ltd, 303)
-*PTARMIGAN MINE* (Cominco)
2:-SALMITA MINE (Giant Yellowknife Mines Ltd, 106)
3:-LUPIN MINE (Echo Bay Mines Ltd, 388)
4:-B-ZONE MINE (Cullaton Lake Gold Mines Ltd, 197)
-*SHEAR LAKE MINE* (Cullaton Lake Gold Mines Ltd)
5:-ELDORADO MINE (Echo Bay Mines Ltd)
-SILVER BEAR MINE }
-NOREX MINE } (Terra Mines Ltd, 132)
-SMALLWOOD MINE }
6:-PINE POINT MINE (Pine Point Mines Ltd, 555)
7:-NANISIVIK MINE (Nanisivik Mines Ltd, 190)
8:-POLARIS MINE (Cominco, 231)
9:-CANTUNG MINE (Canada Tungsten Mining Corp Ltd, 118)
10:-*BULLMOOSE MINE* (Terra Mines Ltd)

AXEL HEIBERG ISL
ELLESMERE ISL
GREENLAND
BANKS ISL
MELVILLE ISL
DEVON ISL
BAFFIN BAY
SOMERSET ISL
PRINCE OF WALES ISL
VICTORIA ISL
BAFFIN ISLAND
YUKON TERRITORY
ARCTIC CIRCLE
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASK
MANITOBA
HUDSON BAY
QUEBEC
1
2
3
4
5
6
7
8
9
10
miles
0 100 200
0 100 200 300
kilometers

FIGURE 2-1: Key to operating and developing mines discussed in text. The table at upper left gives the mine name, operator's name, and the 1983 workforce. Developing mines are in italics.

TABLE 2-1: SUMMARY DATA, NWT MINES, 1982-1983

OPERATING MINES:

MINE	COMMODITY	MILLED (1982)	RESERVES (1982)	MILLED (1983)	RESERVES (1983)
Con	Au (Ag, As_2O_3)	212.4 kt @ 12.34 g Au/t	1,905.1 kt 16.1 g Au/t	189.8 kt @ 12.34 g Au/t	1,723.6 kt @ 15.09 g Au/t
Giant	Au (Ag, As_2O_3)	366.1 kt @ 7.2 g Au/t	889.0 kt @ 8.23 g Au/t	297.0 kt @ 7.71 g Au/t	1,016.0 kt @ 7.89 g Au/t
Salmita	Au, (Ag)	development	139.7 kt @ 26.74 g Au/t	11.9 kt @ 15.63 g Au/t	105.2 kt @ 28.10 g Au/t
Lupin	Au, (Ag)	*199.2 kt @ 8.0 g Au/t	3,128.9 kt @ 13.58 g Au/t	323.0 kt @ 12.0 g Au/t	3,080.0 kt @ 13.58 g Au/t
B-Zone (Cullaton Lake)	Au, (Ag)	*65.9 kt @ 17.0 g Au/t	150.0 kt @ 17.0 g Au/t	*102.0 kt @ 17.0 g Au/t	154.2 kt @ 17.14 g Au/t
Eldorado	Ag, (Cu)	7.5 kt @ 0.53 kg Ag/t	depleted	closed down	closed down
Terra (Silver Bear)	Ag (Cu) (Zn) (Ni) (Co) (Pb) (Cd)	*36.1 kt @ 0.74 kg Ag/t (production mainly from Silver Bear)	63.5 kt @ 0.63 kg Ag/t (from all three mines)	37.5 kt @ 0.73 kg Ag/t	not reported
Terra (Norex)				25.3 kt @ 0.69 kg Ag/t	
Terra (Smallwood)				9.5 kt @ 0.21 kg Ag/t	
Pine Point	Zn, Pb	2218.0 kt @ 7.3% Zn, 3.0 % Pb	31,751.3 kt @ 6.1% Zn, 2.4% Pb	894.0 kt @ 8.1% Zn, 2.7% Pb	23,586.7 kt @ 6.3% Zn, 2.7% Pb
Nanisivik	Zn, Pb, Ag, (Cd)	621.8 kt @ 11.2 Zn, 1.4% Pb, 61 g Ag/t	4400 kt @ 11% Zn, 1.5% Pb	628.1 kt @ 11.1% Zn, 1.5% Pb, 58 g Ag/t	3800 kt @ 10.1% Zn 0.8% Pb
Polaris	Zn, Pb	470.0 kt @ 17.0% Zn, 7.0% Pb	9,979.0 kt @15.2% Zn, 4.4% Pb	829.0 kt @ 16.8% Zn, 5.2% Pb	16,873.0 kt @ 14.8% Zn, 4.1% Pb
Cantung	WO_3	327.5 kt @ 1.28% WO_3	2,757.8 kt @ 1.32% WO_3	36.3 kt @ 1.19% WO_3	2,721.5 kt @ 1.32% WO_3

MINES UNDER DEVELOPMENT:

Shear Lake (Cullaton Lake)	Au	—	—	—	1.0 Mt @ 12 g Au/t (Can. Min. J., June/84)
Bullmoose	Au	—	—	—	145 kt @ 10.97 g Au/t (Northern Miner, Dec. 1/83)
Ptarmigan	Au	—	—	—	100 kt @ 11.7 g Au/t

Reserves at operating mines are in the measured and indicated categories. All data on this page are from company annual reports except for those marked with asterisks, which are from the Mining Inspection Service of the Gov't of the NWT. All reserve and production figures have been rounded to the nearest 100 tonnes.

PROVINCE	DEPOSIT TYPE	GEOLOGICAL ENVIRONMENT	N.T.S.
Slave	epigenetic metamorphic hydrothermal	Shear zones in Archean Kam Formation mafic metavolcanics	85J/8 85J/8.9
		Quartz veins at contact; Yellowknife Supergroup metasediments and metavolcanics	76D/3
	syngenetic exhalative	iron-formation in Archean Contwoyto Formation of the Yellowknife Supergroup	76E/14
Churchill		iron-formation in Archean Henik Group metasediments	65G/7,8
Bear	epigenetic magmatic hydrothermal	fault zones in Aphebian Labine Group supracrustals and comagmatic intrusions	86K/4
			86E/9
			86F/12
			86F/12
Interior Platform	Mississippi Valley	Karsted and dolomitized Middle Devonian Pine Point Group carbonates	85B/10, 15,16
Innuitian Platform		Karsted Neohelikian Society Cliffs Formation dolostone	48C/1
Arctic Platform		Karsted and dolomitized Ordovician Thumb Mountain Formation carbonates	68H/8
Cordilleran Orogen	Skarn	Skarns at contact between Cretaceous intrusions and Paleozoic limestone	105H/16
Churchill	epigenetic fracture-filling	fractures in basal Aphebian Hurwitz Group conglomerate lying unconformably above Archean basement	65G/7,8
Slave	epigenetic metamorphic hydrothermal	quartz veins in Archean Yellowknife Supergroup metasediments	85I/7
Slave	epigenetic metamorphic hydrothermal	quartz veins in Archean Yellowknife Supergroup metasediments	85J/9

TABLE 2-2: METAL PRODUCTION SUMMARY, NWT MINES, 1981-83

COMMODITY	MINE	1981 PROD'N ($ x 10^6)	[1]%	1982 PROD'N ($ x 10^6)	[1]%	1983 PROD'N ($ x 10^6)	[1]%
GOLD	Con	2,326 kg		2,471 kg		2,219 kg	
	Giant	1,825 kg		2,258 kg		1,963 kg	
	Camlaren	456 kg		---		---	
	Salmita	---		---		159 kg	
	B-Zone	14 kg		695 kg		1,147 kg	
	Lupin	---		1,626 kg		3,758 kg	
total Au		4,621 kg ($81.88)	8.9	7,050 kg ($104.62)	11	9,246 kg ($155.05)	13
SILVER	Con	465 kg		494 kg		460 kg	
	Giant	290 kg		459 kg		552 kg	
	Camlaren	148 kg		---		---	
	Salmita	--		---		32 kg	
	B-Zone	--		31 kg		24 kg	
	Lupin	--		not reported		287 kg	
	Terra[2]	1772 kg		28,396 kg		45,539 kg	
	Eldorado	34,214 kg		3,971 kg		---	
	Nanisivik	32,323 kg		30,160 kg		26,225 kg	
total Ag		69,212 kg ($28.07)	6.1	63,511 kg ($19.97)	5	73,119 kg ($33.1)	6.6
ZINC	Pine Point	148,064 t		152,791 t		67,643 t	
	Nanisivik	67,967 t		74,791 t		61,042 t	
	Polaris	3,437 t		93,331 t[4]		117,630 t[4]	
total Zn		219,468 t ($261.84)	24	320,913 t ($343.70)	33	246,315 t ($283.26)	25
LEAD	Pine Point	64,443 t		64,322 t[3]		23,203 t	
	Nanisivik	8,234 t		9,379 t		6,396 t	
	Polaris	1,058 t		35,649 t[4]		34,623 t[4]	
total Pb		73,735 t ($72.22)	27	109,350 t ($79.02)	40	64,222 t ($37.84)	25
TUNGSTEN TRIOXIDE	Cantung	2,513 t		3,583 t		350 t	
total WO_3		2,513 t ($43.07)	100	3,583 t ($46.61)	100	350 t ($3.76)	100
CADMIUM	Nanisivik	233 t		21 t		none	
total Cd		233 t ($1.23)	22	21 t ($0.06)	?	0 t ($0)	?
COPPER	Eldorado	314 t		56 t		---	
	Terra[2]	10 t		90 t		115 t	
total Cu		324 t ($0.71)	0.05	146 t ($0.28)	0.02	115 t ($0.24)	0.02
ARSENIC TRIOXIDE	Con	---		---		250 t	
	Giant	1,094 t		1,780 t		732 t	
total As_2O_3		1,094 t ($0.36)	?	1,780 t ($0.60)	?	982 t ($0.60)	?
TOTAL VALUE, PROD'N		$489.38		$594.86		$513.85	

Production figures were obtained from the Mining Inspection Service of the Gov't of the NWT, who compile them based on monthly production reports submitted by the mines. Footnotes give production figures from company annual reports when these differ substantially from those reported by the Gov't of the NWT.

:The value of production is calculated using the average annual price of metals shown in Table 2-3.

[1] :% of total Canadian production based on production figures reported in the Canadian Mining Journal, Annual Mineral Review editions, Feb., 1981-1983.

[2] :Figures for Terra include the Silver Bear, Norex and Smallwood Mines.

[3] :58,676 t Pb produced according to Cominco Annual Report.

[4] :Cominco Annual Reports for Polaris list the following production: 30,200 t Pb in 1982 and 38,900 t Pb in 1983; 74,032 t Zn in 1982 and 132,200 t Zn in 1983.

NOTE: The Mining Inspection Services of the Gov't of the NWT also reports the following small tonnages of production from the Terra operations: 181 t Pb, 118 t Zn, 3 t Ni, 4 t Co, and 5 t Cd. 33 kg of gold were reportedly won from underground development at Ptarmigan.

Production from the new Lupin Mine and from the B-Zone Mine boosted gold output by more than 50%, even though running-in problems at B-Zone significantly reduced projected recoveries. Cantung set a new production record in 1982 that helped to offset the impact of a 24% decline in the price of tungsten. The value of tungsten output was only slightly higher than that of the previous year, despite a 43% increase in production.

Of the five principal commodities mined in the NWT in 1982, only silver registered a decline in value and output relative to 1981. The small amount of silver produced from Eldorado, which closed during the first quarter of 1982, was mainly from the milling of surface stockpiles. Terra Mines Limited's silver mines in the Camsell River area (Silver Bear, Norex and the new Smallwood Mine, which only came on stream late in the year) posted a great gain in production relative to 1981, but not enough to compensate for the closure of Eldorado. Declining production and lower silver prices in 1982 resulted in a 28% decrease in the value of silver output (Table 2-2).

In 1982, the NWT mines accounted for 8.6% of the value of Canadian metal output and directly employed about 2700 persons. According to the Canadian Mining Journal (Feb., 1984), the value of NWT metal production in 1982 was greater than that individually of Manitoba, Saskatchewan, Alberta, the Yukon Territory and all of the Maritime Provinces except Newfoundland.

1983 OVERVIEW

Despite increases in the average annual price of gold, silver and zinc (Table 2-3), the value of non-hydrocarbon mineral production fell to 514 million dollars, about 14% less than that of the previous year. Depressed lead and zinc prices forced Pine Point Mines to shut down on January 2, 1983. Federal and territorial assistance, wage concessions and reductions in transportation and smelter treatment charges enabled the mine to resume operations by June 15, but the value of the NWT's lead and zinc output declined more than 100 million dollars as a consequence of the closure. The price of tungsten continued to drop, forcing Cantung to suspend mining at the end of January and to supply customers from inventory. Mining at Cantung resumed in December, but at a rate reduced to 450 tpd. As a consequence, the value of tungsten output in 1983 was 43 million dollars less than that of the previous year; a decline of 92%. Output at Giant mine was cut back 25% in order to extend the life of the mine, which even at current reduced rates will be exhausted within 4 years unless additional reserves are found or the price of gold increases.

TABLE 2-3: AVERAGE ANNUAL PRICE OF METALS, 1981-1983 (Cdn. funds used to calculate production values shown in Table 2-2)

METAL	UNIT	1981	1982	% CHANGE 1981-82	1983	% CHANGE 1982-83
Gold	g (oz)	\$17.72 (\$551.18)	\$14.84 (\$461.71)	-16%	\$16.77 (\$521.59)	+13%
Silver	g (oz)	\$0.4056 (\$12.62)	\$0.3144 (\$9.78)	-22%	\$0.4527 (\$14.08)	+44%
Zinc	kg (lb)	\$1.193 (\$0.5424)	\$1.071 (\$0.4867)	-10%	\$1.15 (\$0.5227)	+7.4%
Lead	kg (lb)	\$0.9745 (\$0.4452)	\$0.7226 (\$0.3284)	-26%	\$0.5892 (\$0.2678)	-18.5%
WO_3	kg (lb)	\$17.14 (\$7.79)	\$13.01 (\$5.92)	-24%	\$10.74 (\$4.88)	-17%
As_2O_3	kg (lb)	\$0.334 (\$0.152)	\$0.335 (\$0.152)	none	\$0.606 (\$0.275)	+181%
Cadmium	kg (lb)	\$5.26 (\$2.39)	\$2.71 (\$1.23)	-48%	\$2.20 (\$1.00)	-19%
Copper	kg (lb)	\$2.208 (\$1.00)	\$1.94 (\$0.8824)	-12%	\$2.09 (\$0.9507)	+8%

Sources

Gold, silver, zinc, lead and copper prices from Canadian Mining Journal, Feb. 1983, Feb. 1984.
WO_3 price from Cantung Annual Reports, 1981 to 1983.
Cadmium and As_2O_3 prices from Government of the N.W.T., Mining Reports, 1981 to 1983.

The performance of the precious-metal mines, particularly Lupin and B-Zone, partly salvaged what otherwise would have been a dismal year for the NWT mining industry. The Lupin Mine had its first year of full production, a year that saw the mill capacity expanded 20% to 1100 tpd. Output from the B-Zone Mine almost doubled after operational problems experienced in 1982 were resolved under new management by Camchib Resources Incorporated. Giant Yellowknife Mines Limited brought the Salmita gold mine into production in August, and Cominco won 33 kg of gold from underground development at the Ptarmigan Mine (production from Ptarmigan is not included in Table 2-2). The value of gold output from the NWT in 1983 was 155 million dollars, about 50% more than that of the previous year and almost double that of 1981. The NWT's share of Canadian gold production climbed from 9% in 1981 to 13% in 1983.

The value of silver output in 1983 was 33 million dollars, 65% more than that of the previous year. This improvement reflects higher silver prices and increased production from the Silver Bear, Norex and Smallwood mines of Terra Mines Ltd. In 1983, Terra announced plans to double the capacity of their mill from 225 tpd to 450 tpd.

In 1983, the NWT mines accounted for 7.1% of the value of Canadian metal ouput and directly employed about 2500 persons.

FUTURE DEVELOPMENTS

Three gold mines (Table 2-1) may come on stream in the near future: Bullmoose (Terra Mines Limited), Ptarmigan (Cominco) and Shear Lake (Cullaton Lake Gold Mines Limited). Bullmoose and Ptarmigan, both of which produced briefly during the early 1940's, are small quartz-vein deposits hosted in Archean turbidites of the Yellowknife Supergroup. The Shear Lake deposit is 5 km from the B-Zone Mine and is hosted in Aphebian quartzite of the Hurwitz Group.

Plans to develop the Prairie Creek silver-lead-zinc deposit, reported as a potential producer in the previous Mineral Industry Report (Brophy, 1984), were placed on hold in mid-1982 because of a slump in metal demand and prices. Recently, the Ontario Securities Commission issued a cease-trading order on shares of Cadillac Explorations Limited, the majority owner of the deposit. Litigation is in progress and it is unlikely that Prairie Creek will be brought to production in the near future.

Shear Lake Deposit

Shear Lake is the most interesting of the gold deposits that may soon come on stream. It is hosted in sheared, highly oxidized, pyritic quartzite of the Aphebian Hurwitz Group. A 425-m decline that reached the 60-m level late in 1983 intersected several previously undiscovered gold-bearing shear zones. A reserve potential of about 1.0 Mt grading 12 g Au/t above the 180-m level is indicated.

Little has been written about this deposit, but it is interesting to speculate on similarities between the geological setting of Shear Lake and that of the gold mines in the Rand (Witwaterstrand area of South Africa). The Hurwitz Group is the same age (Aphebian) as the Witwaterstrand Series and, for the most part, consists of the same kind of rock (quartzite and conglomerate). Both the Hurwitz Group and the Witwaterstrand Series are metamorphosed to lower greenschist facies and, over large areas, lie unconformably on Archean basement rocks that themselves were metamorphosed prior to deposition of the Aphebian sediments (Eade, 1974; Boyle, 1979). The Archean basement in both areas is known to host gold deposits (Laporte, 1984; Elevatorski, 1981) and may be a source for the gold in the overlying Aphebian sediments. The Aphebian sediments in both areas accumulated in large basins and were derived from a mature, cratonic source. Most of the Witwaterstrand gold deposits are syngenetic accumulations (paleo-placers) in reefs of pyritic, quartz-pebble conglomerate, but the possibility exists that gold at Shear Lake has been remobilized from a similar setting. It is also perhaps more than coincidental that uranium is often associated with the Witwaterstrand gold ores, and that the Aphebian sediments hosting the Shear Lake deposit have been the focus of uranium exploration for several years (Laporte, 1984).

Padgham (1984) reports 17 gold showings in the Aphebian Hurwitz Group. Based on published information by others, he suggests that the gold at Shear Lake may have been mobilized from underlying Archean basement and deposited in the shears.

FORMAT OF CHAPTER 2

In this chapter, the operating mines are discussed in the same sequence as they are listed in Table 2-1. Furthermore, they are subdivided into four groups according to the main commodity produced: gold

(Con, Giant, Salmita, Lupin and B-Zone); silver (Silver Bear, Norex and Smallwood); lead-zinc (Pine Point, Nanisivik and Polaris) and tungsten (Cantung). An introduction is written to provide an overview for each group. The Eldorado Mine, which only produced during the first quarter of 1982, is not described in detail in this Mineral Industry Report (MIR). For more information on Eldorado, the reader is referred to the 1980-81 MIR (Brophy, 1984). The discussion of each mine includes a section entitled **REFERENCES**, under which an abbreviated bibliography of papers pertinent to the deposit is presented. A complete reference list that includes all sources named in the text is appended to the end of the chapter. The SI (metric) system is used throughout this chapter. For those unfamiliar with the SI system, a list of relevant conversions to the Imperial system is given in Table 2-4.

TABLE 2-4: KEY TO ABBREVIATIONS AND METRIC/IMPERIAL CONVERSION TABLE

g = grams
t = tonne
tpd = tonnes per day
Mt = megatonnes = 10^6 tonnes
kt = kilotonnes = 10^3 tonnes
oz = troy ounces
ton = short ton

31.103 g = 1 oz
34.286 g/t = 1 oz/ton
0.90718 Mt = 10^6 tons
0.90718 kt = 10^3 tons
1 g = 0.03215 oz
1 g/t = 0.02917 oz/ton
1 t = 1.1023 tons
1 Mt = 1,102,311 tons
1 kt = 1,102.31 tons

To avoid duplication, most mines are described more briefly than in the previous MIR, although the new mines are discussed in detail. For more elaborate descriptions of the older mines, refer to the 1980-1981 MIR (Brophy, 1984).

GOLD MINES: CON, GIANT, SALMITA, LUPIN, B-ZONE

INTRODUCTION AND REVIEW

Twenty-four mines have contributed to the NWT's gold output since production began in 1935, but only 11 (Fig. 2-2) have produced more than 100 kg of gold. Of these 24 mines, all but two (Fox and B-Zone) are in the Slave Structural Province and are hosted in Archean rocks of the Yellowknife Supergroup (Fig. 2-2). The NWT gold mines can be classified according to the four geological environments in which they are found:

A) in volcanics of the Yellowknife Supergroup (in simple quartz veins or more complex shear zones)
B) at the contact between volcanic rocks and sedimentary rocks of the Yellowknife Supergroup (in strata-bound quartz veins)
C) in iron-formation within Archean turbidites
D) in quartz veins within turbidites of the Yellowknife Supergroup.

Only the Fox Mine, which is in Aphebian sediments of the Athapuscow Aulacogen, does not fit into this four-fold classification.

Two graphs (Fig. 2-3) summarize NWT gold production by mine and by class. The upper graph summarizes almost half a century of gold production and highlights the fact that deposits in the volcanic-hosted class have been by far the most prolific gold producers. About 87% of the NWT's gold output has come from shear zones and quartz veins in the Yellowknife Volcanic Belt (Con and Giant mines). Another 10% has come from three mines at volcanic-sedimentary contacts, and about 2% from two deposits hosted in iron-formation. The remaining seventeen mines, all turbidite-hosted quartz-vein deposits, have accounted for only 1% of NWT gold output. The explorationist should be aware that these deposits tend to be small, irregularly mineralized and difficult to mine profitably. On the other hand, shear zones in volcanics, volcanic-sedimentary contacts and turbidite-hosted iron-formations, all in Archean terranes, appear to be more rewarding targets.

Operating Mines

The five gold mines that operated in 1982 and 1983 include two volcanic-hosted deposits (Con and Giant), two iron-formation-hosted deposits (Lupin and B-Zone) and one contact-type deposit (Salmita). The lower graph in Figure 2-3 summarizes production from these operating mines in 1983 (output from development at Ptarmigan is also included). Immediately obvious is the fact that gold production from the iron-formation-hosted deposits has surpassed that of the volcanic-hosted deposits. In fact, 1983 is the first year that the Yellowknife-area gold mines have not produced most (75% to 90%) of the NWT's gold. With dwindling reserves at Con and Giant, it is

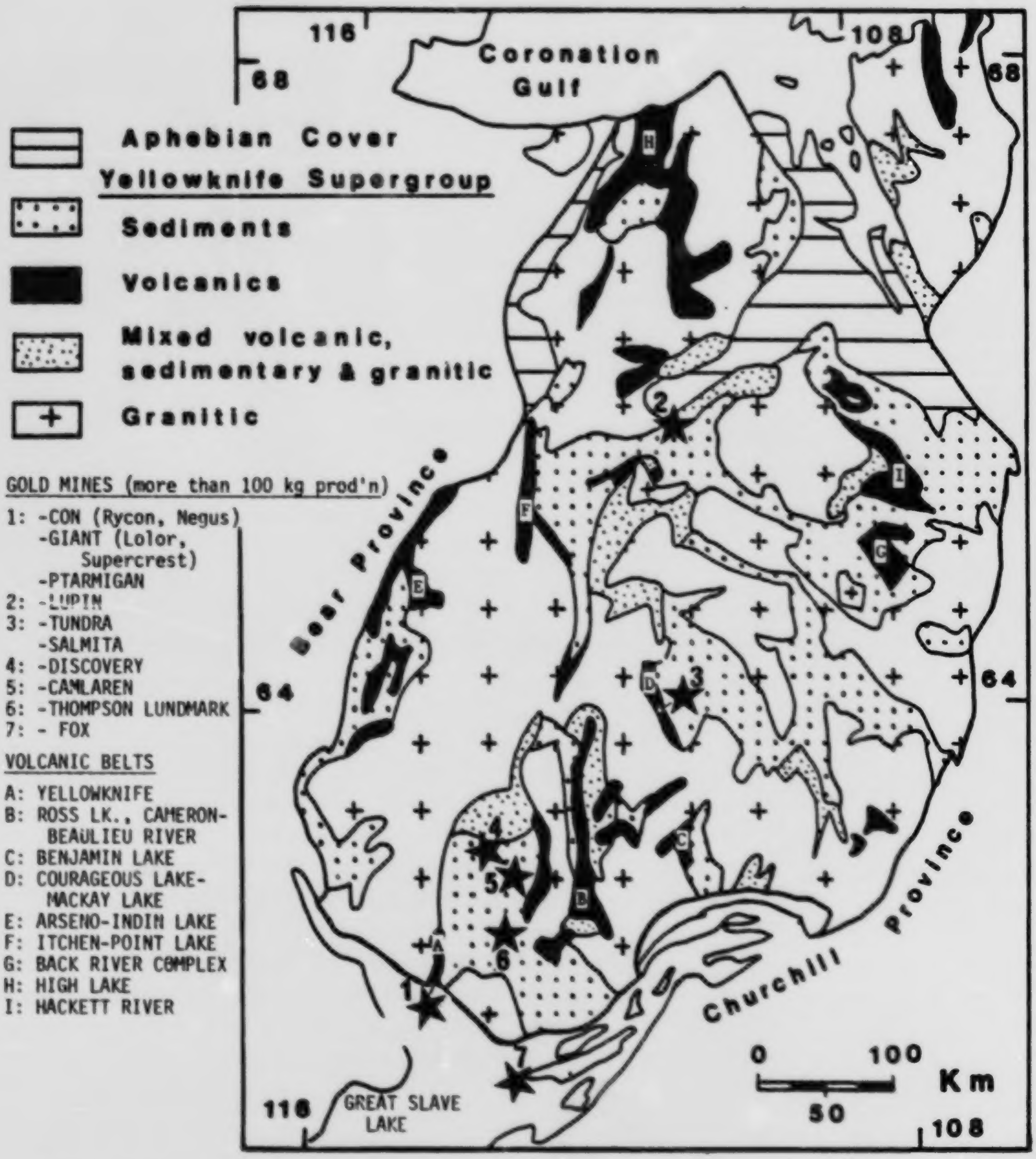

116
108
68
64
Coronation Gulf
Aphebian Cover
Yellowknife Supergroup
Sediments
Volcanics
Mixed volcanic, sedimentary & granitic
Granitic
GOLD MINES (more than 100 kg prod'n)
1: -CON (Rycon, Negus)
-GIANT (Lolor, Supercrest)
-PTARMIGAN
2: -LUPIN
3: -TUNDRA
-SALMITA
4: -DISCOVERY
5: -CAMLAREN
6: -THOMPSON LUNDMARK
7: - FOX
VOLCANIC BELTS
A: YELLOWKNIFE
B: ROSS LK., CAMERON-BEAULIEU RIVER
C: BENJAMIN LAKE
D: COURAGEOUS LAKE-MACKAY LAKE
E: ARSENO-INDIN LAKE
F: ITCHEN-POINT LAKE
G: BACK RIVER COMPLEX
H: HIGH LAKE
I: HACKETT RIVER
Bear Province
Churchill Province
GREAT SLAVE LAKE
0
50
100
Km

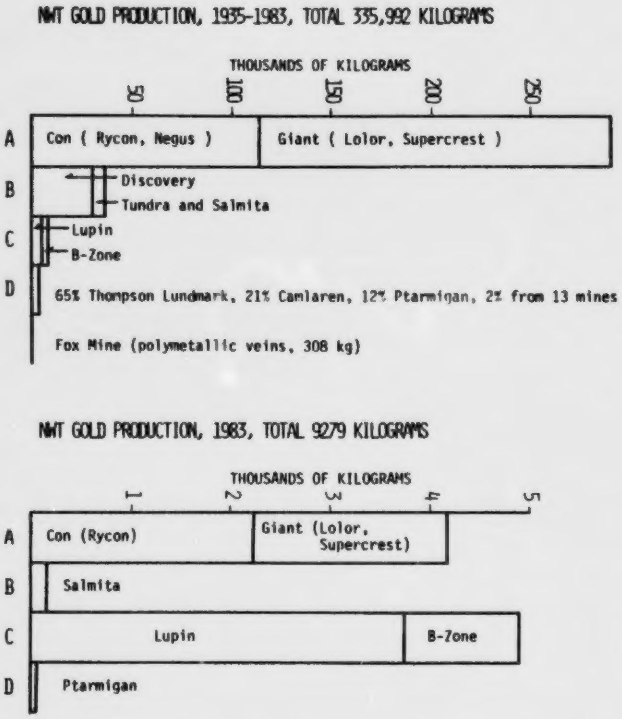
FIGURE 2-2: Generalized geological map of the Slave Structural Province showing the principal volcanic belts and all the gold mines in the NWT that have produced more than 100 kg of gold except B-Zone. Gold mines are marked with bold stars. (after Dillon-Leitch, 1981)

expected that this trend will continue in the years to come.

Volcanic-Hosted Deposits: Con and Giant

The Con and Giant deposits are in the Yellowknife Volcanic Belt (Fig. 2-2) at the western margin of the Yellowknife Supracrustal Basin. The deposits are in sheared mafic volcanics of the upper part of the Kam Formation (Fig. 2-4), the thickest volcanic formation of the Yellowknife Supergroup in the Yellowknife area. Most of the gold is in quartz veins or in chlorite-sericite-carbonate alteration zones in the Campbell and Giant shear systems, which may have once been continuous but are now offset about 5 km by the West Bay Fault (Campbell, 1947; see Fig. 2-4).

The deposits are thought to have been formed from


NWT GOLD PRODUCTION, 1935-1983, TOTAL 335,992 KILOGRAMS

NWT GOLD PRODUCTION, 1983, TOTAL 9279 KILOGRAMS

FIGURE 2-3: Gold production in the NWT by mine and by class (discussed in text). A: volcanic-hosted B: at sedimentary-volcanic contacts C: iron-formation-hosted D: quartz veins in turbidites.

gold-bearing solutions derived metamorphically from either the lower part of the volcanic belt or the underlying basement (Myers, 1981). The deposits are at the transition between greenschist- and amphibolite-grade facies of metamorphism (Boyle, 1961; Kerrich, 1981) where style of deformation changes from brittle to ductile (Helmstaedt and others, 1981).

The Con and Giant deposits are dissimilar in some respects. Con ore zones tend to be narrower and shorter in plan length, but longer in dip length than those at Giant. The Campbell system at Con is more strongly sheared than the Giant system, and ore now mined at Con is free-milling and contains less sulphides and arsenides than Giant ore (Padgham, 1975).

Iron-Formation-Hosted Deposits: Lupin and B-Zone

The Lupin Mine in the Slave Structural Province (Fig. 2-2) and the B-Zone Mine in the Churchill Structural Province (Fig. 2-13) are hosted in Archean iron-formation and are considered to be syngenetic-exhalative deposits related to chemical sedimentation at or near sites of fumarolic brine emission onto the sea floor (Gibbins, 1981). Gold in both deposits is associated with sulfide-rich iron-formation (mainly pyrrhotite, pyrite and arsenopyrite), although silicate-rich iron-formation is present at Lupin and silicate, oxide and carbonate-rich iron-formations have been documented at B-Zone. The mines have been compared to other Archean iron-formation-hosted gold deposits in the world such as the Homestake Mine in South Dakota and the Pickle Crow Mine in northwestern Ontario (Gibbins, 1981; Page, 1981). Although the gold grades at Lupin and B-Zone are comparable, Lupin is a world-class deposit having 20 times the ore reserves of B-Zone (Table 2-1) and a life expectancy of more than ten years. In the future, gold production from Lupin alone is expected to exceed the combined output of the Con and Giant mines.

Volcanic-Sedimentary Contact Deposit: Salmita

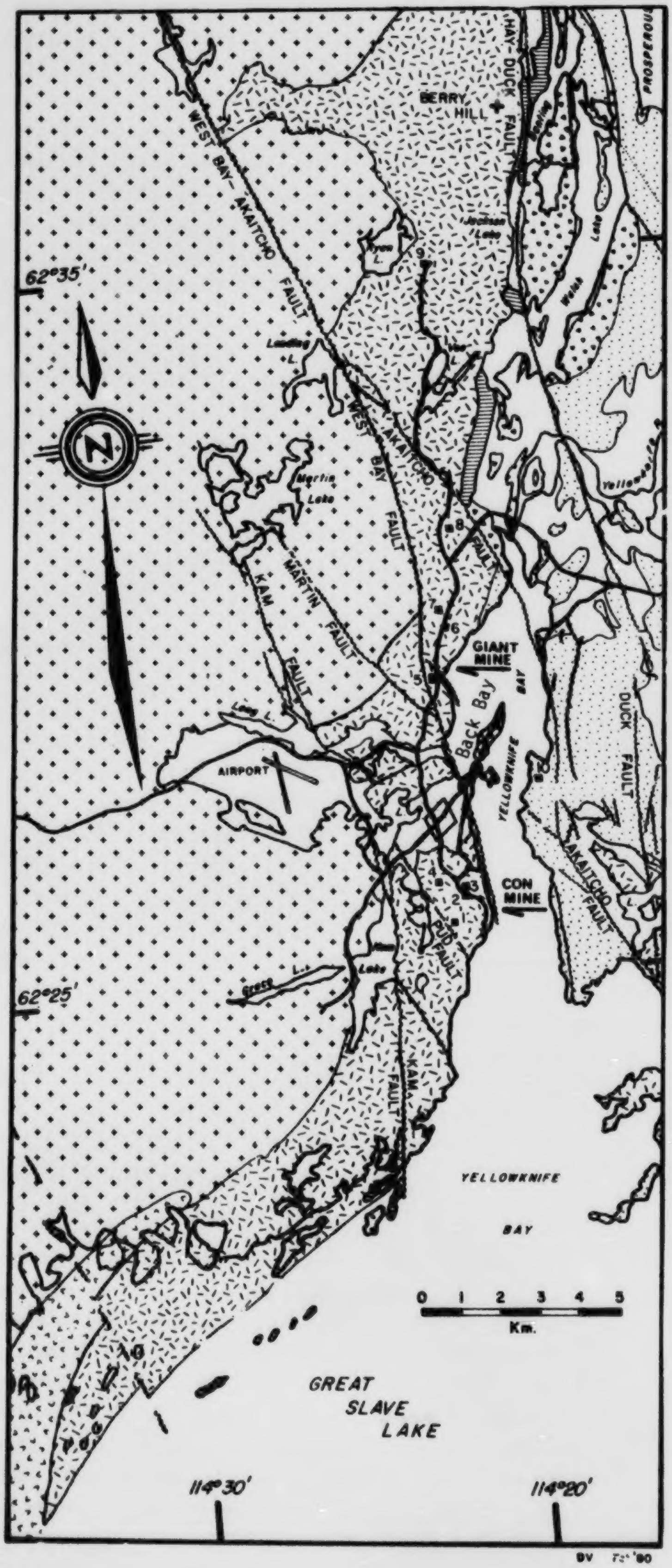
Salmita is a small but high-grade deposit situated on the east shore of Matthews Lake (Fig. 2-2). Gold is in a quartz vein bounded by footwall argillite and hangingwall basalt. Ransom (1983) speculates that the gold was deposited with siliceous sinter in a shallow basin during a hiatus in clastic volcanism when geothermal hot-spots were active. Two other former gold producers, the Discovery and Tundra Mines (Fig. 2-2), are in similar geological environments. The potential of such deposits is exemplified by Discovery, from which about one million tonnes of ore grading 34 g Au/t was mined.

CON MINE

Cominco Ltd.	Gold,Silver
P.O. Box 2000	85J/8
Yellowknife, NWT, X1A 2M1	Con shaft at:
	62°26'22"N,114°22'08"W

REFERENCES

Numerous references to the Con mine and environs can be found in papers by: Boyle (1961); Breakey (1977); Campbell (1947); Helmstaedt and others (1981); Henderson (1970, 1975, 1976, 1978); Henderson and Brown (1966); Kerrich (1981); Myers (1981); McMurdo (1979); Padgham (1975, 1981); Sproule (1952). Boyle's excellent paper is the most comprehensive of these, and discusses in detail the geology, geochemistry and origin of the gold deposits of the Yellowknife district.


HAY-DUCK FAULT
PROSPEROUS
BERRY HILL
WEST BAY-AKAITCHO FAULT
Jackson Lake
Walsh Lake
Landing L.
62°35'
Martin Lake
WEST BAY FAULT
AKAITCHO FAULT
Yellowknife R.
KAM FAULT
MARTIN FAULT
GIANT MINE
Back Bay
YELLOWKNIFE BAY
DUCK FAULT
Long L.
AIRPORT
AKAITCHO FAULT
CON MINE
PUD FAULT
Kam Lake
Grace L.
62°25'
KAM FAULT
1
2
3
4
5
6
7
8
9
10
YELLOWKNIFE BAY
0 1 2 3 4 5
Km.
GREAT SLAVE LAKE
114°30'
114°20'
DV Feb '80

GEOLOGY OF THE YELLOWKNIFE VOLCANIC BELT

SHOWING

PROTEROZOIC FAULTS and MINE SHAFTS

⬚	Pleistocene and recent
⁺	Granodiorite and related intrusives
	YELLOWKNIFE SUPERGROUP
▨	Burwash and Walsh Formations: mudstone, greywacke, clastic flows
●	Banting Formation: clastic flows and volcaniclastic sediments, some pillowed volcanic flows
▤	Jackson Lake Formation: conglomerate and sandstone
▨	Kam Formation: basalt
▨	Octopus Formation: basic tuff (?) greywacke, siltstone, agglomerate

MINE SHAFTS

1. Robertson	6. Giant C
2. Negus	7. Giant B
3. Rycon	8. Akaitcho
4. Con	9. Crestaurum
5. Giant A	10. Burwash

Geology after Jolliffe (1942, 1946), Henderson and Brown (1966), Henderson (1975), Helmstaedt (1981).

FIGURE 2-4: Geology of the Yellowknife Volcanic Belt showing Proterozoic faults and mine shafts (geology after Jolliffe, 1942, 1946; Henderson and Brown, 1966; Henderson, 1975; and Helmstaedt, 1981)

PROPERTY

CON 1-4; GG 1-14; MEG 1-10; MIDNIGHT 1; NEGUS 1-4; PIZ 1-2; P&G 1-4; 1 ROSE claim; SOL 1-4; STAR 1-2.

Cominco holds 60% interest in Rycon Mines Ltd's P&G group and full interest in all the other claims listed. Interests in Vol Mines Ltd (66.7%; N'KANA claims), Kamcon Mines Ltd (74%; KAM, KAMEX, and AYE claims) and Ptarmigan Mines Ltd (91.2%; JACK and LILY claims) give Cominco control of about 100 additional claims in the Yellowknife area. Cominco also has an option on fifteen claims (CAG, DAW and PRW claims) held by Yellorex Mines Ltd. All but the JACK and LILY claims, which are about 11 km northeast of Yellowknife, are shown in Figure 2-6.

LOCATION

The Con-controlled claims lie partly within Yellowknife's city limits. The mill is about 1.6 km south of the center of Yellowknife (Fig. 2-6).

HISTORY

The Con, Rycon and Negus mines developed as separate entities, but because they are now linked by underground workings and controlled by Cominco, they are most often referred to collectively as the Con mine.

CON 1-14 were staked for Cominco in 1935. The C-1 shaft was collared in 1937 to exploit the Con shear (Figs. 2-5, 2-6), and a 90-tpd mill, later increased to 320 tpd, was put into operation. The first gold bar was poured September 3, 1938.

P&G 1-4 (RYCON group) were staked by Tom Payne and George Latham in 1936. Cominco obtained controlling interest in the claims the following year and in 1938 incorporated Rycon Mines Ltd to explore and develop the Rycon Shear. The Rycon shaft (Fig. 2-6) was collared in 1938 and the first ore from the Rycon mine was received at the Con mill in 1939. The C-1 and Rycon shafts, about 950 m apart, are connected by crosscuts on the 500- and 950-foot levels (Fig. 2-5).

NEGUS 1-6 were staked by Ole Hagen and George Goodwin in 1936-37 and transferred to Negus Mines Ltd in 1938. The Negus shaft was collared to exploit the Negus Shear (Figs. 2-5, 2-6) and a 40 tpd mining operation began in 1939 and continued until ore was exhausted in 1952. During the last years of operation most of the Negus ore came from the Campbell Shear Zone, which will be discussed in greater detail later. Between 1939 and 1952, the Negus mine produced 7,956 kg of gold from 445,342 t of ore for an average grade of 17.8 g/t (0.52 oz/ton). The NEGUS claims were purchased by Cominco in 1953 and the underground workings are now part of the Con mine ventilation system.

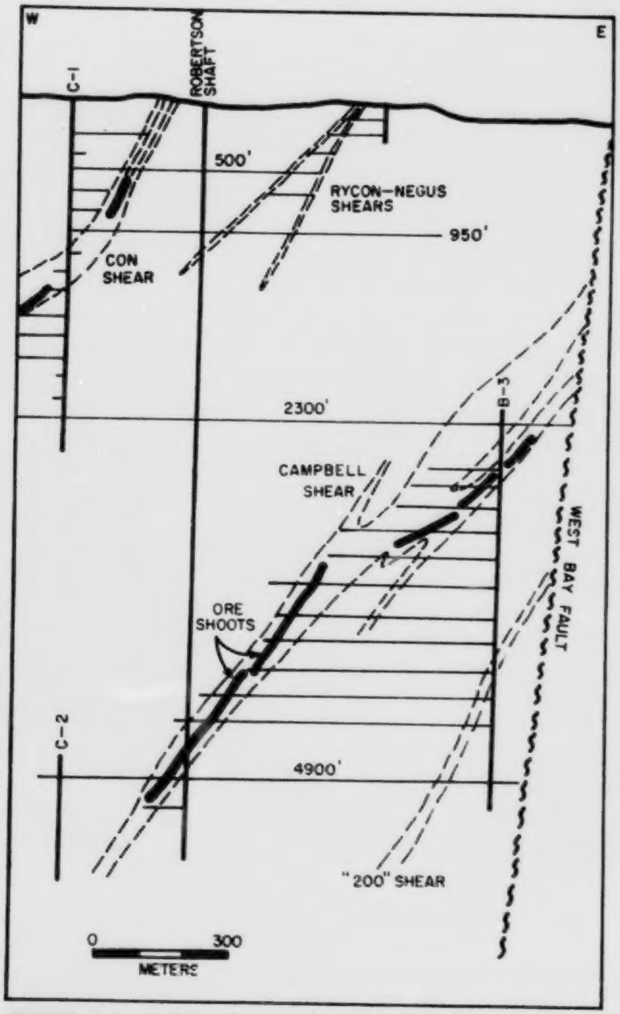


FIGURE 2-5: Schematic section showing shear zones and underground development, Con Mine (from McMurdo, 1976)

Cominco further consolidated its holdings in the area between 1936 and 1948 by acquiring the MEG, MIDNIGHT, PIZ, ROSE, SOL and STAR claims, which adjoin the core CON-PG-NEGUS claims. The GG claims were added in 1976.

Resource shortages during World War II caused mining at Con, Rycon and Negus to be suspended between 1943 and 1946, during which time development work was done by a small crew directed by geologist Neil Campbell. Using marker beds and dikes, Campbell established the offsets on the major Proterozoic faults and deduced that a major shear zone, an

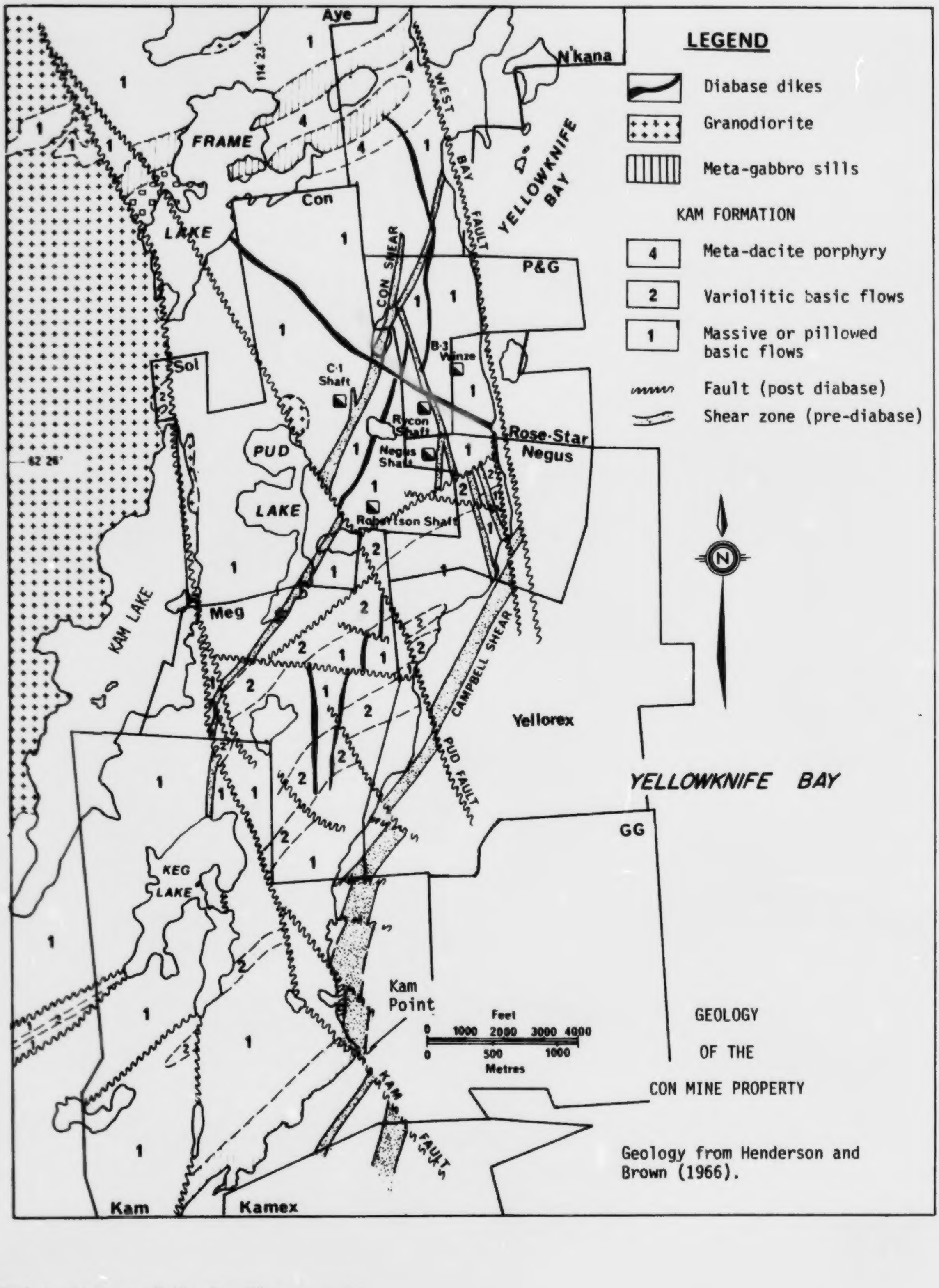

LEGEND
Diabase dikes
Granodiorite
Meta-gabbro sills
KAM FORMATION
4 Meta-dacite porphyry
2 Variolitic basic flows
1 Massive or pillowed basic flows
Fault (post diabase)
Shear zone (pre-diabase)
Aye
N'kana
FRAME
LAKE
Con
WEST BAY FAULT
YELLOWKNIFE BAY
CON SHEAR
P&G
Sol
C-1 Shaft
B-3 Winze
Rycon Shaft
Negus Shaft
Robertson Shaft
Rose-Star
Negus
PUD
LAKE
KAM LAKE
Meg
CAMPBELL SHEAR
PUD FAULT
Yellorex
YELLOWKNIFE BAY
GG
KEG LAKE
Kam Point
KAM FAULT
Kam
Kamex
114°23'
62°28'
Feet
0 1000 2000 3000 4000
0 500 1000
Metres
GEOLOGY OF THE CON MINE PROPERTY
Geology from Henderson and Brown (1966).

FIGURE 2-6: Geology of the Con Mine property

extension of the Giant Shear Zone offset along the West Bay Fault, might underlie the eastern CON-RYCON-NEGUS claims. His hypothesis was confirmed when a gold-bearing zone, later named the Campbell Shear, was intersected by deep drilling in 1944. The C-1 shaft was deepened, a crosscut was driven 1100 m easterly on the 2300-foot level, and in 1950 the B-3 winze (Figs. 2-4, 2-5) was collared to exploit the Campbell Shear Zone. By 1958, ore in the Con, Rycon and Negus shears was essentially exhausted, and since then the bulk of production has been from the Campbell Shear Zone.

In 1970 the Con mill, which had been treating refractory sulfide ore, was converted to treat the free-milling gold found in the deeper levels of the mine. In 1971 the C-2 winze (Fig. 2-6) was driven from the 4,900-foot level to the 5,600-foot level directly beneath the C-1 shaft to explore for new ore. In 1977, the 1655-m-deep Robertson Shaft was completed and the mill capacity was increased to 590 tpd.

From 1938 to 1983, the Con, Rycon and Negus Mines have produced 115,573 kg of gold from 5.96 Mt of ore for an average grade of 19.39 g Au/t.

DESCRIPTION

The Kam Formation forms a northeasterly striking, steeply southeast-dipping, homoclinal succession of principally mafic, massive to pillowed volcanic flows intruded by westerly dipping dikes and irregular bodies of gabbroic composition. To the west, these mafic rocks are intruded by plutons including the Western Granodiorite Batholith. The plutons, volcanics and mafic dikes are in turn cut by a series of northeasterly and northwesterly trending diabase dikes. The West Bay Fault and several other north- to north-northwest-trending Proterozoic faults displace all lithologies. The ore-bearing shear zones cut the volcanics and gabbroic dikes, but not the diabase dikes (Henderson and Brown, 1966). This fortunate circumstance of cross-cutting relationships was used to reconstruct the volcanic belt and to discover the Campbell Shear Zone (Campbell, 1947).

The Con Shear, which strikes about 020° and dips steeply west, is 3 to 75 m wide and has been traced for 8 km. The Rycon and Negus shears, which are splays from the Con Shear, trend more northerly and are not as wide on average or as long. The Campbell Shear Zone, which roughly parallels the Con Shear, is 60 to more than 300 m wide and has also been traced for 8 km.

Ore in the shear zones is in lenses and veins of white to dark-grey quartz. The ore bodies, typically 2 to 6 m wide and 90 m long, are localized in dilational zones: flexures in the shear systems, intersections of converging shears, and pressure shadows of undeformed volcanic horses that were rotated during shearing. Shear zones are altered to chlorite schist, and ore bodies are generally enveloped by a chlorite-carbonate-sericite alteration zone as thick as 2 m. Ore shoots tend to dip 2° to 4° more steeply, and schistosity 10° to 15° more steeply, than the shear zones. This, along with the dragfold geometry of quartz veins, is taken as evidence that the major schist zones are essentially thrust faults (Boyle, 1961).

Gold-bearing quartz usually contains pyrite, arsenopyrite, stibnite, chalcopyrite, pyrrhotite, sphalerite, galena, silver and a variety of sulphosalts and tellurides. Gold forms minute nuggets, films and plates in fractures, vugs or vein contacts and is also present in the sulphosalts and iron sulphides.

CURRENT WORK AND RESULTS

Development at Con from 1981 to 1983 is summarized in Table 2-5; production and reserves from 1976 to 1983 are shown in Table 2-6.

TABLE 2-5: DEVELOPMENT, CON MINE, 1981-1983

DEVP'T	1981	1982	1983
Lateral	2344m	2772m	2429m
Raising	389m	858m	572m
Underground drilling	13,652m	20,589m	23,187m
Surface drilling	9 holes 3592m	14 holes 4293m	small amount

Sources: Mining Inspection Service, Gov't of the NWT, and Con Mine personnel

TABLE 2-6: PRODUCTION AND RESERVES, CON MINE 1976-1983

	PRODUCTION		RESERVES	
Year	kt Mined	kg Au Recv'd	Mt Reserves	g Au/t
1976	136	2800	1.33	20.3
1977	142	2900	1.48	19.9
1978	192	3550	1.50	19.6
1979	197	2950	1.63	17.9
1980	192	3000	2.00	16.8
1981	176	2300	1.90	16.8
1982	212	2470	1.90	16.1
1983	190	2220	1.72	15.1

1982 Ore mined in 1982 was of a lower grade than that mined the previous year; 12.34 g Au/t compared to 14.1 g Au/t in 1981. However, gold output increased 6% to 2471 kg because of a 20% increase in mill throughput (Table 2-6). A 13-million dollar arsenic trioxide plant was completed in 1982. The plant will treat the arseniferous wastes that accumulated when roasting was required to recover gold and silver prior to 1970. Arsenic sludge is converted into purified arsenic trioxide, a granular compound that is used as a wood preservative. The residue is treated to extract gold and silver. It has been estimated that the wastes contain 23 kt of arsenic trioxide, 406 kg of gold and 977 kg of silver.

Underground diamond drilling in 1982 at levels 60 m below the present mine workings as well as in areas adjacent to workings was encouraging. Tonnages about equal to the ore mined in 1982 were added to reserves. Surface diamond drilling tested the down-rake extension of a gold-bearing zone on the MEG claims (Yellorex South) and investigated the grade and tonnage potential in a portion of the Campbell Shear Zone southwest of the Kam Fault (Kam Point South).

1983 Less ore was processed in 1983 because of a two-month strike at mid-year. Gold output declined from 2471 kg in 1982 to 2219 kg in 1983, but a 13% increase in the price of gold more than compensated for this reduced production.

Encouraging deep-drilling results prompted a decision to deepen the Robertson Shaft by 247 m to 1900 m. This 9-million dollar project, which will provide four more working levels, is scheduled to be completed in 1985.

Full production from the new arsenic recovery plant was delayed because of difficulties in reaching process and product specifications. The plant is expected to operate at design capacity in 1984.

Surface drilling in 1983 was limited to several shallow holes near Negus Point.

GIANT MINE

Giant Yellowknife Mines Ltd.	Gold,Silver
Yellowknife, N.W.T.	85J/8,9
	"C" shaft at:
	62°29'57"N,114°21'40"W

REFERENCES

Numerous references to the Giant mine and environs can be found in papers by: Boyle (1961); Helmstaedt and others (1981); Henderson (1970, 1975, 1976, 1978); Henderson and Brown (1966); Hodgson (1976); Kerrich (1981); Myers (1981); Padgham (1975, 1981). Boyle's excellent paper (GSC Memoir 310, 1961) is the most comprehensive of these and describes in detail the geology, geochemistry and origin of the gold deposits of the Yellowknife district.

PROPERTY

Giant group: GIANT 1-21, GIANT X1-X5, LAW 2-3.
Lolor group: 6 LOLOR claims
Supercrest group: AES 27 to 50, 1 FB(Fr) claim

Giant Yellowknife Mines Ltd has full ownership of the Giant group, 87.5% interest in Lolor Mines' Lolor group and 50.01% interest in Supercrest Mines Ltd's Supercrest group. Conwest Exploration Company Ltd has the remaining interest in the Lolor group and Akaitcho Yellowknife Mines Ltd in the Supercrest group. Giant Yellowknife also holds 58.5% interest in about 150 claims to the north (Lynx and Northbelt options). The remaining interest is divided between Falconbridge Nickel Mines Ltd (32.3%) and Transcontinental Resources Ltd (9.2%).

LOCATION

The main C shaft is about 5.0 km north of Yellowknife city centre.

HISTORY

The Giant, Lolor and Supercrest (Akaitcho) mines developed as separate entities, but because they are now connected by underground workings and controlled by Giant Yellowknife Mines Ltd they are referred to collectively as the Giant Mine.

GIANT 1-21 were staked for Burwash Yellowknife Mines Ltd in 1935. Giant Yellowknife Gold Mines was incorporated in 1937 to develop the property, but little was done until 1943 when Frobisher Explorations, a subsidiary of Ventures Ltd, signed an agreement to gain management control of the Giant group. That same year, Frobisher's consulting geologist, Dr. A.S. Dodson, mapped the claims and deduced that ore might be found in the relatively unprospected ground underlying Baker Creek Valley. This hypothesis was confirmed in January of 1944 when the gold-bearing Giant Shear Zone was intersected by diamond drilling. The A, B and C shafts were collared, a 450 tpd mill was put into operation, and the first gold brick was poured in May, 1948. The mill capacity was increased by stages to 900 tpd in 1960, the year that Giant Yellowknife Gold Mines amalgamated with Consolidated Sudbury Basin Mines Ltd to form Giant Yellowknife Mines Ltd. With a 1962 Ventures Ltd merger, Giant Yellowknife became one of the Falconbridge Group of Companies.

In 1974, production started from the A-1 open pit (Fig. 2-7) after a feasibility study indicated that 435,000 t grading 10.3 g Au/t could be mined profitably. Other open pits, shown in Figure 2-7, soon came into production. Open pits now account for 27% to 40% of mill feed.

Today, the main C shaft extends to a depth of 644 m and services eleven levels. The A and B shafts extend to about 240 m and service five levels each. All shafts are connected by a 2300 m haulageway at the 750-foot level. Mill capacity is now 1100 tpd.

The Lolor group was staked in 1936 and acquired by Conwest Exploration Co Ltd in 1938. Lolor Mines Ltd was incorporated in 1953, five years after Giant Yellowknife Gold Mines acquired 87.5% interest in the claims. The Lolor mine began production in 1967, operating from an extension on Giant's 425-foot level. The Lolor Mine has supplied about 3.8% of the Giant operation's total mill feed.

The Supercrest group was staked in 1936 for Aerial Exploration Syndicate Ltd and acquired in 1938 by Frobisher Exploration Co Ltd. After drilling in 1944-45, Akaitcho Yellowknife Gold Mines Ltd was incorporated to develop the claims. By 1948, 17,200 m of drilling had been completed, four ore-shoots identified and the Akaitcho shaft collared. In 1964, Supercrest Mines Ltd, jointly owned by Akaitcho Yellowknife and Giant Yellowknife, was formed to bring the property to production. A drift to the Akaitcho ore zone was started from the 750-foot level of the Giant mine and had advanced to a point directly below the Akaitcho shaft by 1967, the year that production from Supercrest began. Today, the Supercrest mine is being developed from extensions on Giant's 425, 575, 750 and 1100-foot levels. A new extension begun in 1979 along the 1500-foot level was completed in 1981. The Supercrest Mine has supplied about 4.8% of the Giant operation's total mill feed.

From 1948 to 1983, the Giant operations have produced 175,278 kg of gold from about 10.7 Mt of ore for an average grade of 16.9 g/t gold.

DESCRIPTION

The geology of the mine area (Fig. 2-7) is similar to that previously described for the Con mine.

The Giant Shear Zone is a northerly trending, generally west-dipping, subparallel, interlacing and splaying network of shears enclosing zones of chlorite-carbonate-sericite schist up to 762 m long and 137 m wide. Within these altered zones, gold-bearing quartz veins and lenses up to 15 m wide are localized in dilational zones: flexures in the shear system, intersections of converging shears and pressure shadows of undeformed "horses" that were rotated during shearing (Boyle, 1961). The Giant Shear Zone has been traced for about 5 km, and ore shoots to a depth of about 600 m. Ore zones tend to be longer in plan and shallower than those at Con. As the gold is generally associated with arsenopyrite, the ore is more refractory. Ore bodies contain about 7% metallic minerals; mainly pyrite, arsenopyrite, stibnite, sphalerite, chalcopyrite, galena and sulfosalts.

CURRENT WORK AND RESULTS

Development at Giant from 1981 to 1983 is summarized in Table 2-7; production and reserves from 1976 to 1983 are shown in Table 2-8. As a result of a study completed in 1982 to establish an optimum mining rate for improved extraction, the rate was decreased from 30 kt per month in 1982 to 24.7 kt per month in 1983. Another study in 1982 to determine whether effluents contained dissolved gold resulted in the design and installation of a carbon column recovery unit in 1983 that will be fully operational in 1984. Significant capital expenditures in 1982 included $342,000 to construct a new tailings dam and $169,000 to complete a new effluent treatment plant.

During 1982, 1.36 kt of arsenic trioxide were shipped compared to 1.09 kt the previous year. Test work was continued to determine the feasibility of recovering arsenic trioxide stored in underground workings. In 1983, 0.73 kt of arsenic trioxide were shipped, but prices received for the product decreased substantially.*

*This information, from Giant annual report, conflicts with Gov't NWT information (Table 3) who report increased value for As_2O_3 in 1983

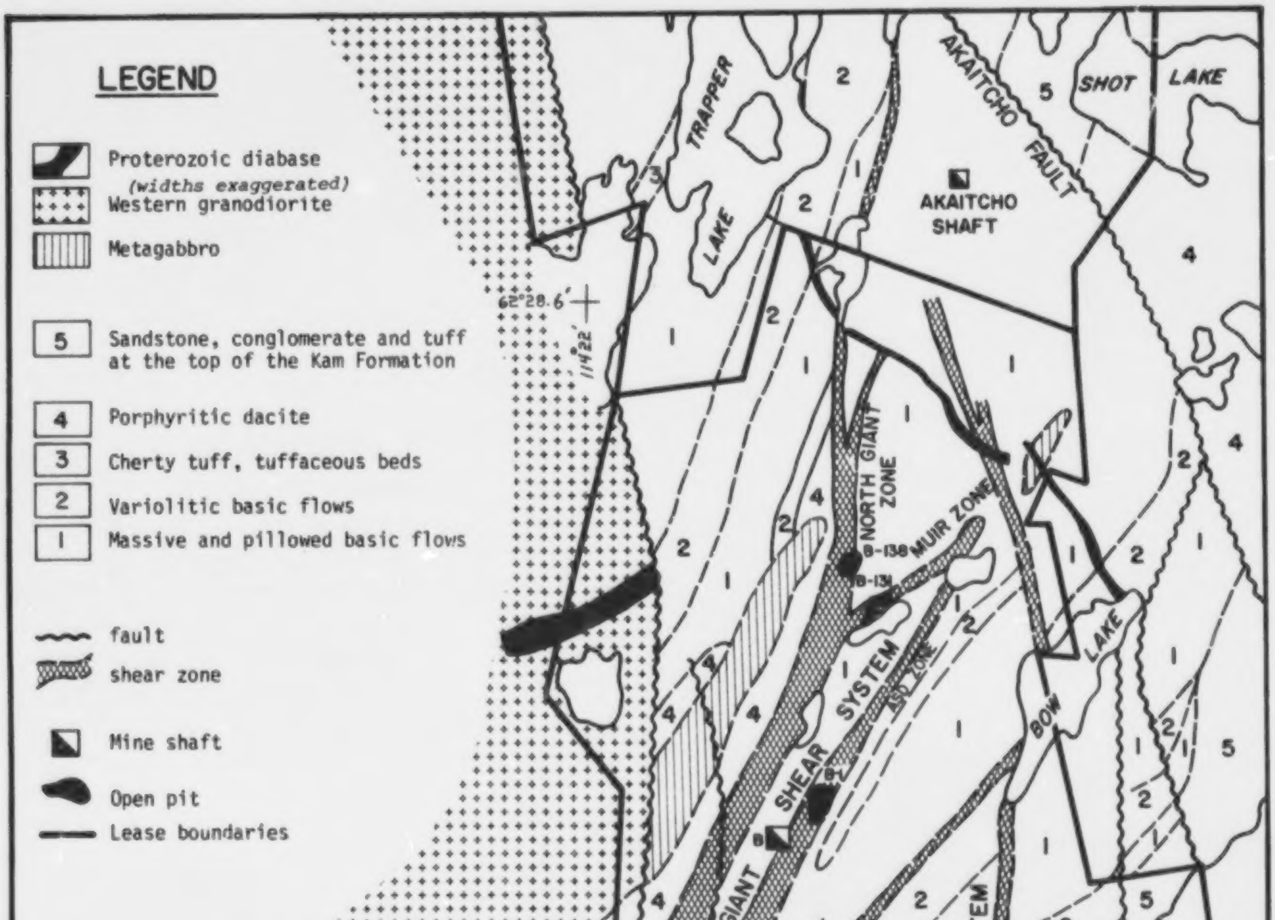

LEGEND
Proterozoic diabase
(widths exaggerated)
Western granodiorite
Metagabbro
5 Sandstone, conglomerate and tuff at the top of the Kam Formation
4 Porphyritic dacite
3 Cherty tuff, tuffaceous beds
2 Variolitic basic flows
1 Massive and pillowed basic flows
fault
shear zone
Mine shaft
Open pit
Lease boundaries
N
TRAPPER LAKE
SHOT LAKE
AKAITCHO FAULT
AKAITCHO SHAFT
62°28.6'
114°22'
NORTH GIANT ZONE
MUIR ZONE
B-138
B-131
GIANT SHEAR SYSTEM
ASD ZONE
B
B-1
BOW LAKE
BOW LAKE SYSTEM
C
C-1
WEST BAY FAULT
HANDLE SYSTEM
HANDLE LAKE
MARTIN FAULT
JOE LAKE
WEST ZONE
TOWNSITE FAULT
A
A-1
A-2
SOUTH ZONE
YELLOWKNIFE BAY
0 1000 2000 3000 Feet
0 250 500 750 Metres

FIGURE 2-7: Geology of the Giant Mine property (from Henderson and Brown, 1966)

Gold recovery increased from 83.4% in 1981 to 85% in 1982 and 1983. However, operations in 1983 were adversely affected by failures of the roaster in March and April because of high antimony levels in the ore.

TABLE 2-7: DEVELOPMENT, GIANT MINE, 1981-1983 (GIANT, LOLOR, AND SUPERCREST)

DEV'T	1981	1982	1983
Lateral	5154m	5132m	3428m
Raising	515m	796m	850m
*Drilling	25,079m	8708m	8533m

**mainly underground drilling*
Source: Giant Annual Reports, 1981-1983

TABLE 2-8: PRODUCTION AND RESERVES, GIANT MINE (GIANT, LOLOR and SUPERCREST) 1976-1983

	PRODUCTION		RESERVES	
Year	kt Mined	kg Au Recv'd	Mt Reserves	g Au/t
1976	390	3350	1.36	11.7
1977	405	3300	0.80	11.7
1978	360	2950	1.20	9.3
1979	380	2350	1.85	7.2
1980	205	1190	1.80	7.2
1981	360	1825	1.10	8.2
1982	366	2260	0.90	8.2
1983	297	1960	1.00	7.9

Giant Mine

A three year summary (1981-1983) of production and related data from the Giant Mine is given in Table 2-9. Mining of richer ore zones, better grade-control and increased mill throughput resulted in improved gold output in 1982. Although higher-grade ore was mined in 1983, gold output declined with initiation of the planned cutback in underground mining. Diamond drilling in 1982 was confined to producing areas of the mine. In 1983, a decline was driven towards the DCW Zone near the A shaft; a zone that has reserves of 29.5 kt grading 10.63 g Au/t and is scheduled to begin production in July of 1984.

Another zone, the UBC Zone near the B Shaft, will be developed by a decline early in 1984. Diamond drilling has indicated reserves of 16.3 kt grading 19.2 g Au/t in this narrow vein, which has additional potential both along strike and down dip. Considerable work was done in 1983 to divert Baker Creek for access to an extension of a pit near the C Shaft. The extension zone is estimated to have ore reserves of 71.7 kt grading 8.57 g Au/t.

TABLE 2-9: GIANT MINE: PRODUCTION, RESERVES, OPERATING COSTS AND OPEN-PIT MILL FEED, 1981-1983

Year	1981	1982	1983
kg Au Output	1769	2213	1923
kt Mined	350	359	294
Grade g Au/t	6.07	7.23	7.68
Mt Reserves	1.06	0.86	0.99
Grade g Au/t	7.43	8.23	7.89
$ Cost/g Au	14.29	12.71	12.87
% from open pits	27	24.5	32.6

Source: Giant Mine Annual Reports, 1981-1983

Lolor Mine

A three-year summary (1981-1983) of production and related data from the Lolor Mine is given in Table 2-10. Development work was minor and there was no diamond drilling done in 1982 or 1983.

TABLE 2-10: LOLOR MINE: PRODUCTION, RESERVES AND OPERATING COSTS; 1981-1983

Year	1981	1982	1983
kg Au Output	36.1	44.4	20.9
kt Mined	5.23	6.77	2.81
Grade g Au/t	8.74	7.41	10.9
kt Reserves	14.5	7.26	5.44
Grade g Au/t	8.23	7.20	8.23
$ Cost/g Au	10.48	11.40	12.33

Source: Giant Mine Annual Reports, 1981-1983

Supercrest Mine

Supercrest was not mined during 1982 or 1983. The grade of ore was recalculated to a slightly lower figure (Table 2-11). Ore-definition diamond drilling from the 1500-foot level was completed.

TABLE 2-11: SUPERCREST MINE: PRODUCTION, RESERVES AND OPERATING COSTS; 1981-1983

Year	1981	1982	1983
kg Au Output	19.6		
kt Mined	3.54	not mined in 82-83	
Grade g Au/t	6.89		
kt Reserves	24.5	24.5	24.5
Grade g Au/t	12.7	11.7	11.7
$ Cost/g Au	36.98	not mined in 82-83	

Source: Giant Mine Annual Reports, 1981-1983

SALMITA MINE

Giant Yellowknife Mines Ltd.	Gold, Silver
Yellowknife, NWT	76 D/3
XOE OHO	64°4.5'N,111°14.5'W

REFERENCES

Dillon-Leitch (1981, 1984); Folinsbee and Moore (1950); Henderson (1944); Lord (1951); Moore (1951, 1956); Ransom (1983).

PROPERTY

Lease numbers 3040 to 3070 covering 561 ha and comprising the following claims: LT 1-3, LUFF 1-4, SALERNO 1-18 and TOUGH 1-6. Giant has also acquired the properties of Tundra Gold Mines Ltd. to the south. These properties are encompassed in Lease 3104 covering 857 ha and comprising the following claims: JEJA 1-6, MAD 1-18 and REP 1-12. Unleased claims contiguous with the above properties include GIANT 1 and WIN 1-18.

LOCATION

Salmita is on the east shore of Matthews Lake, 240 km north-northeast of Yellowknife. A 1350-m-long gravel airstrip lies about 5 km by gravel road from the mine. An ice road to Yellowknife is operational during January and February.

HISTORY

Regional mapping at a 1:253,440 scale by Henderson (1944) was followed by detailed mapping of part of the Matthews Lake area (NTS 76 D/3) at a 1:24,000 scale by Moore (1956). Other geological reports on the Matthews Lake area include Moore (1951) and Folinsbee and Moore (1950). Ransom (1983) summarized the history and presented a geological update of the Salmita Mine, and Dillon-Leitch (1981) studied the volcanic stratigraphy, structure and metamorphism in the Courageous Lake-MacKay Lake Volcanic Belt. The following historical information is mainly from Ransom (1983).

The first of several gold showings in the Matthews Lake area was found in 1939. The SALERNO, LT, LUFF and TUFF claims were staked between 1945 and 1951. Salmita Northwest Mines Ltd. was formed to develop these properties and considerable trenching, diamond drilling and geological mapping were carried out. In 1952, a 44-m vertical shaft was sunk into one vein (B Vein) and 20 m of drifting was done. Ore grade was estimated at 27 g Au/t over 1.68 m. No further work was done until the properties were acquired by Bluebell Enterprises Ltd. between 1970 and 1973 and optioned to Giant Yellowknife Mines Ltd. in 1974.

In 1975, 20 drill holes totalling 2687 m probed the B Vein and a 320-m development decline was completed. Airborne VLF-EM and magnetometer surveys by Kenting outlined a number of parallel conductors, one of which lay along strike and to the south of the B Vein. Drilling in 1976 confirmed that this conductor is caused by a narrow massive sulphide zone within altered turbidites near a zone of graphitic fault gouge.

No further work was done until 1981 when a feasibility study recommended extensive underground development to substantiate grades and tonnages.

DESCRIPTION

The northerly trending Courageous Lake-MacKay Lake Volcanic Belt (Fig. 2-8) is a steeply east-dipping, 65-km-long, 1- to 5-km-thick succession of Archean mafic flows including subordinate mafic agglomerate, mafic breccia, intermediate lava, quartz-feldspar porphyry, phyllite and mica schist. There are two cycles of felsic lava within this predominantly mafic succession; Cycle 1 near the base and Cycle 2 at the top (Fig. 2-8). Cycle 1 felsic lavas attain a maximum thickness of 60 m and host massive, stringer and disseminated sulfides containing copper, zinc and silver. Cycle 2 felsic lavas are up to 1800 m thick and are associated with many of the gold-bearing quartz veins in the region. The volcanic succession is flanked (overlain) to the east by turbidites comprising greywacke, slate and minor conglomerate and chert. These supracrustal rocks, part of the Yellowknife Supergroup, are intruded by various granitic rocks (granodiorite, tonalite, trondjhemite and granite), some of which may be older than the Yellowknife Supergroup (Dillon-Leitch, 1981). The granitic rocks crop out mainly to the west of the volcanic belt (Fig. 2-8). Proterozoic diabase dikes of the Mackenzie Dike Swarm are the youngest rocks in the area.

The supracrustal rocks have undergone three stages of metamorphism: 1) regional metamorphism of greenschist-facies grade; 2) thermal metamorphism of low to high amphibolite-facies grade associated with granitic intrusions and 3) late, hydrothermal, retrograde metamorphism. Although the volcanic rocks form a simple, east-facing homocline, the sedimentary rocks were folded and cleaved during three major

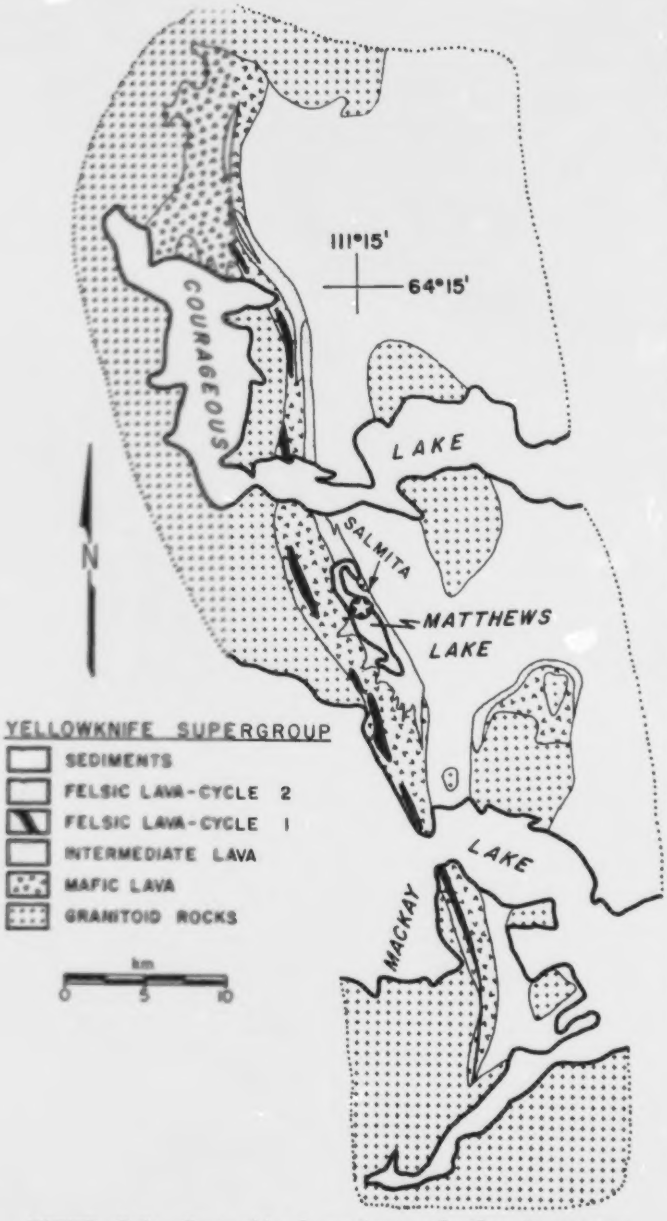


FIGURE 2-8: Generalized geology of the Courageous Lake-MacKay Lake volcanic belt (from Dillon-Leitch, 1981)

phases of deformation (Dillon-Leitch, 1981).

The B Vein at Salmita is one of many gold-bearing quartz veins at or near the contact between the volcanic and sedimentary rocks of the Yellowknife Supergroup. Ransom shows 15 gold showings along a 35-km segment of the contact; 8 on the volcanic side, 4 on the sedimentary side and 3 at the contact (Fig. 2 of Ransom, 1983). Only two of the showings, both within sediments, are more than half a kilometer from the contact, suggesting that it is an important structure controlling the localization of deposits (Moore, 1956). Furthermore, many of the deposits appear to be spatially associated with the felsic lavas of Cycle 2 (Fig. 2-8). For a detailed description of some of the gold-bearing veins in this area, refer to Lord (1951) and Moore (1956).

The B Vein lies within the Cycle-2 felsic domain to the west of the main contact discussed above, but on a detailed scale (Fig. 2-9) is seen to lie at a volcanic-sedimentary contact between footwall argillite to the west and hangingwall basalt to the east. The B Vein dips 80^0 to 85^0 east, is 150 m long, 1.5 to 2.5 m wide and is divided into three steeply south-plunging ore shoots separated by the Salmita Shear Zone in the south and a waste zone carrying minor gold in the north (Fig. 2-9). Free-milling gold in the quartz vein is associated with minor scheelite, arsenopyrite, pyrite, pyrrhotite, galena and sphalerite. Native gold is mainly within gangue adjacent to arsenopyrite, although a few grains are enclosed in arsenopyrite and rarely within pyrrhotite. The gold is commonly 2 to 12 micrometers in size, although nugget-size patches of free gold occur rarely. The wall rocks close to the vein are intensely silicified, carbonatized and sulfidized. Minor alteration products include tourmaline, chlorite and sericite.

A highly speculative, six stage genetic model for the emplacement and mineralizing history of the area was proposed by Ransom (1983) and is reproduced below.

STAGE	MINERAL-IZATION PERIOD	REMARKS
One	One	Massive outpourings of basalt along a major rift (?). Minor periods of felsic ejecta with associated massive sulfide development in structurally favourable loci (Cycle-1 volcanics of Fig. 2-8).
Two		Development of local calc-alkali centres that produce quartz porphyry stocks and release large volumes of rhyodacite flows, contemporaneously with continuous basaltic flows laterally, especially to the south.
Three	Two	Quiescence in extrusive activity.

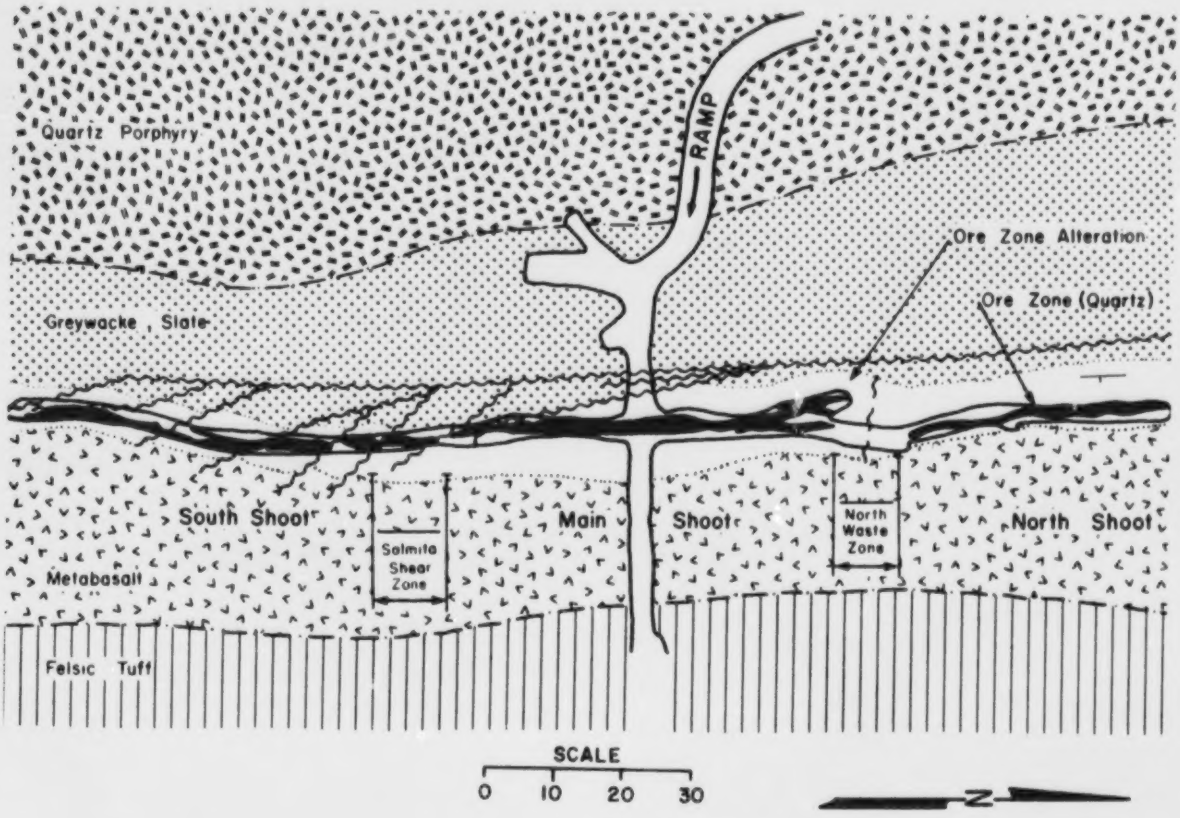

Quartz Porphyry
RAMP
Ore Zone Alteration
Ore Zone (Quartz)
Greywacke , Slate
South Shoot
Salmita Shear Zone
Main Shoot
North Waste Zone
North Shoot
Metabasalt
Felsic Tuff
SCALE
0 10 20 30
N

FIGURE 2-9: Geology at the 95-m level, Salmita Mine (from Ransom, 1983)

STAGE	MINERAL-IZATION PERIOD	REMARKS
		Small "lagoonal" facies black shale development in shallow basin(s). Geothermal hot spots are active with development of siliceous sinter (with gold, i.e., B-Vein) and barren, sulfide-facies iron-formation. Continues into Stage 4.
Four	Three	a) Local basaltic flows fill shallow basins and cap siliceous sinters. b) Sinters continue and/or new centres develop higher up the pile during or immediately after felsic tuff deposition.
Five	Four	Turbidite sedimentation with penecontemporaneous-to-post - deformation (?), "Last-gasp" silica flow into weak, well-capped structures and shear zones.
Six		Faulting, intrusion of diabase and gabbro, rotation.

CURRENT WORK AND RESULTS

Exploration to substantiate grades and tonnages was completed in July of 1982 and included driving a new 1060-m footwall ramp (13% decline) to the 95-m level and two drifts in ore on the 50-m and 95-m levels. These drifts tested strike lengths of 102 m and 180 m respectively. Eighteen diamond drill holes totalling 2076 m tested the B Vein and confirmed continuity of ore to the 200-m level. Early in 1983, recalculation of mineable ore reserves to 140 kt grading 27 g Au/t justified a production decision. The properties and assets of Tundra Gold

Mines Ltd. were purchased and the old Tundra mill, 5.3 km south of the Salmita mine site, was rehabilitated. Mining began on July 14, 1983. The mill was running by August 4 and the first bullion was poured on September 19. The decline was advanced 832 m to the 4th (205-m) level and mining was in progress on three levels by year-end. In 1983, 11.9 kt of ore grading 15.6 g/t Au were processed, although three times this amount was mined. Recoveries averaged 85.3% for a bullion output of 159 kg Au. Most of the ore treated in 1983 was from low-grade development headings.

LUPIN MINE

Echo Bay Mines Ltd.	Gold,Silver
#500, 10909 Jasper Ave.	76 E/14
Edmonton, Alta., T5J 3L9	65°46'N,111°13.5'W

REFERENCES

Bostock (1977, 1980); Covello (1983); Fraser (1964); Gibbins (1981); Kerswill and others (1983); Tremblay (1966, 1967, 1976).

PROPERTY

Lease #2428 covering 2,832 ha and comprising the following claims: CONGO 1-9, 111 MOP claims, PAT 1-3.

LOCATION

The Lupin Mine is on the west shore of northern Contwoyto Lake, 402 km north-northeast of Yellowknife. A 1,525-m-long gravel airstrip is adjacent to the mine and a winter road connecting to Yellowknife is operational between February and April.

HISTORY

Bostock (1980) mapped the regional bedrock geology of the Itchen Lake area (NTS 76 E (W 1/2) and 86 H (E 3/4)) at a 1:250,000 scale and also reported on the composition of iron-formation in the area (Bostock, 1977). Tremblay (1976) mapped the bedrock geology of the Contwoyto Lake area (NTS 76 E/11,14) at a 1:50,000 scale and also summarized the results of his earlier investigations (Tremblay; 1966, 1967). Gibbins (1981) and Kerswill and others (1983) summarized the geology of the mine area, and Covello (1983) summarized exploration strategies for finding iron-formation-hosted gold deposits in the Contwoyto area.

The following historical information is mainly from Echo Bay Mines Limited's annual reports for 1980 and 1981. The main showing was discovered by a Canadian Nickel Company Limited (Canico) reconnaissance crew in 1960. Exploration from 1961 to 1964 included mapping, trenching, geophysical surveying and 11,870 m of diamond drilling that outlined about 1.2 Mt of ore grading 17.14 g Au/t. The property was optioned by Echo Bay Mines Limited in February of 1979 and purchased in November of 1980 subject to royalty payments. During 1979 and 1980, Echo Bay reviewed earlier work and conducted underground exploration by driving a spiral ramp 664 m to a vertical depth of 137 m. Seventy-seven holes totalling 7,040 m were drilled from the ramp; all but two intersected gold. Drilling was planned so that ore reserves could be calculated to a depth of 198 m below surface, but one hole was drilled deep and intersected 9.6 m (true width) grading 19.9 g Au/t at a depth of 468 m. In February of 1981, a first public issue of Echo Bay Mines securities was sold to finance development and bring the Lupin Mine to production. Surface facilities, constructed mainly during 1981, included a powerplant, a 9,300-sq-m mill and recovery plant complex, tailings dams, a tailings line and a residential complex that can accommodate 240. About 3,000 m of drifting were done and more than 127 kt of ore grading about 10.3 g Au/t were stockpiled. Construction of a three-compartment vertical shaft to a planned depth of 366 m was well advanced by year-end. In September of 1981, proven and probable ore reserves above the 198-m level were estimated at 2.19 Mt grading 12.0 g Au/t.

DESCRIPTION

The Lupin Mine region is underlain by turbidites of the Yellowknife Supergroup that have been intruded by various Archean granitic rocks as well as by Proterozoic diabase dikes (Bostock, 1980; Tremblay, 1976). The turbidites, mainly greywacke, mudstone or metamorphic equivalents, have been subdivided by Bostock (1980) into the Itchen Formation and the Contwoyto Formation (Fig. 2-10). The Contwoyto Formation is defined by the essential presence of scattered bands and lenses of silicate, sulfide or oxide-rich iron-formation. The Itchen Formation is an extensive unit of turbidites similar to the Contwoyto Formation, but lacking iron-formation. The Lupin area is underlain by complexly folded Contwoyto Formation turbidites that have been metamorphosed under conditions of the upper greenschist facies. The

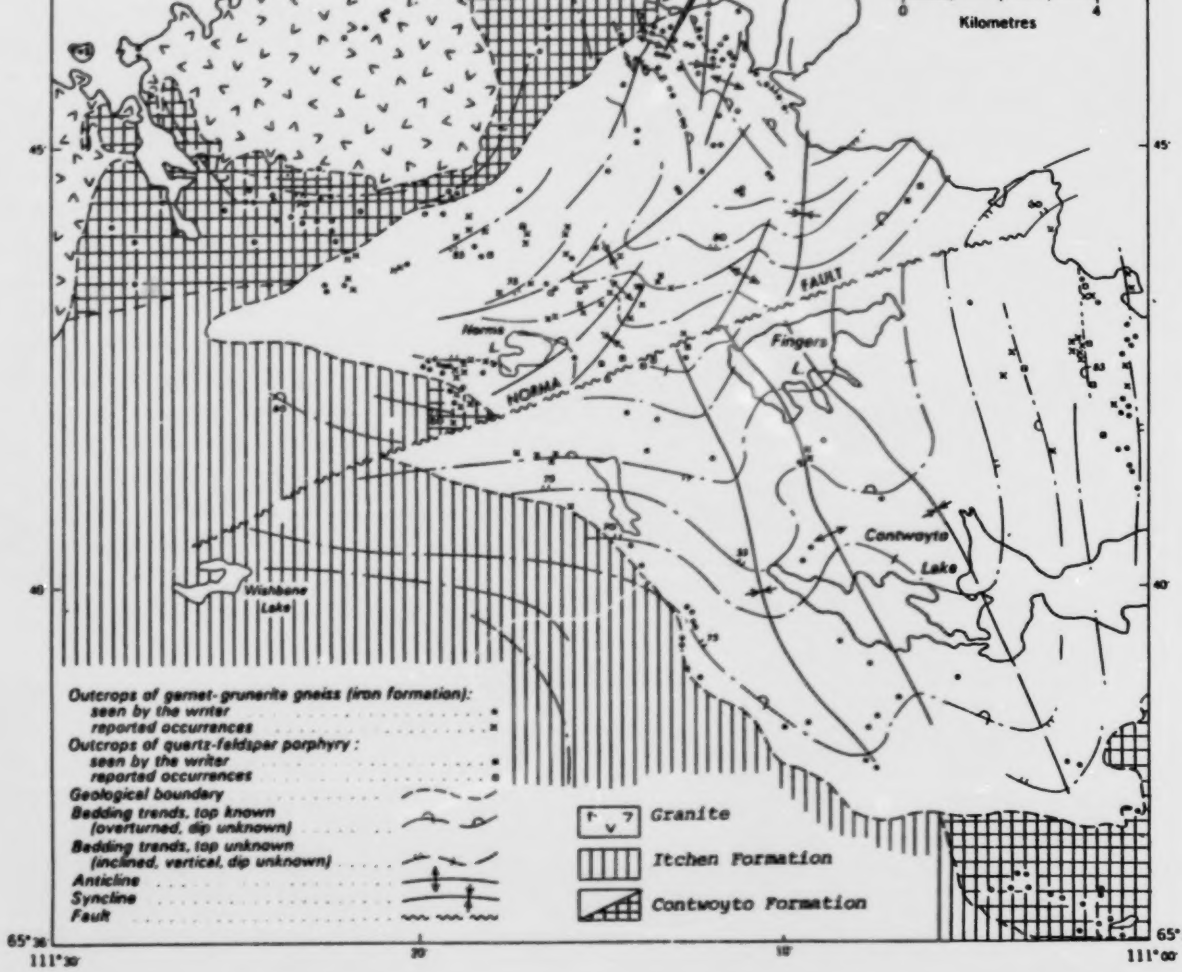

111°30'
20'
10'
111°00'
65°50'
65°50'
CONTWOYTO
LAKE
LUPIN MINE
Miles
0
3
0
4
Kilometres
45'
45'
FAULT
Norma
NORMA
Fingers
L.
Contwoyto
Lake
Wishbone
Lake
40'
40'
Outcrops of garnet-grunerite gneiss (iron formation):
seen by the writer
reported occurrences
Outcrops of quartz-feldspar porphyry :
seen by the writer
reported occurrences
Geological boundary
Bedding trends, top known (overturned, dip unknown)
Bedding trends, top unknown (inclined, vertical, dip unknown)
Anticline
Syncline
Fault
Granite
Itchen Formation
Contwoyto Formation
65°36'
65°36'
111°30'
20'
10'
111°00'

FIGURE 2- 10 General geology of the Lupin Mine area. Contwoyto Formation argillite and greywacke metamorphosed to greenschist facies are shown in white; amphibolite-grade facies are cross-hatched. The Itchen Formation in the map area is metamorphosed to amphibolite facies and is distinguished from the Contwoyto Formation by the absence of iron-formation lenses. (modified from Tremblay, 1976) transition to amphibolite-grade facies is about one kilometer to the west of the mine (Fig. 2-10).

The gold at Lupin is in a Z-shaped, steeply north-plunging, stratabound silicate and sulfide-facies iron formation unit that has been tightly to isoclinally folded into a syncline-anticline pair. Most of the gold is in the west and east limbs of the syncline; the Centre Zone and East Zone respectively (Fig. 2-11). Additional ore is found in the west limb of the anticline (West Zone). The 5-m to 25-m-wide Centre Zone and the 0.5-m to 7-m-wide West Zone strike northerly whereas the East Zone, which is 3 m to 12 m wide, strikes northeasterly. All zones are steeply dipping, about 270 m to 300 m long, and persist at least to the 330-m level, although the East and Centre Zones are narrower at this depth than at surface.

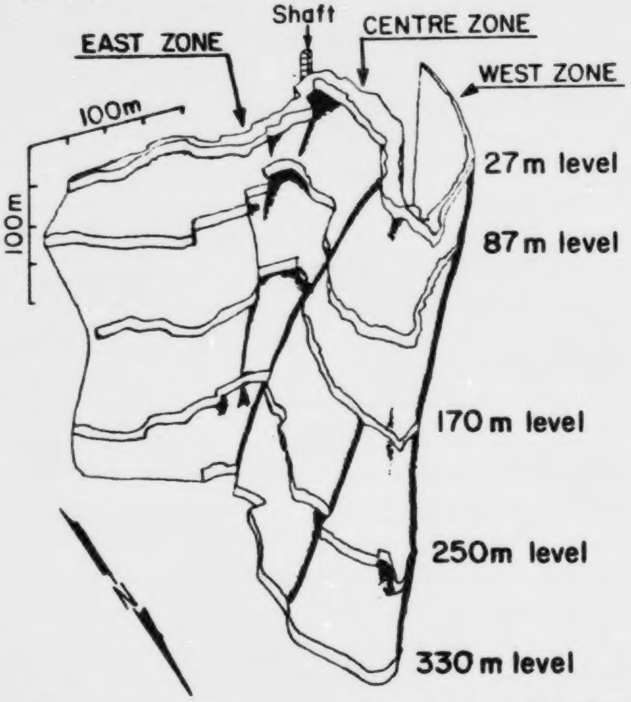


FIGURE 2-11: Isometric view of the Lupin orebody from the 27-m to the 330-m level (from Echo Bay Mines Ltd. annual report, 1982)

The silicate and sulfide-facies iron-formation consists primarily of amphibole (mainly grunerite), quartz and opaques (mainly sulfides). Silicate-facies iron-formation may have poikilitic almandine garnet as an important constituent, whereas sulfide-facies iron-formation is dominated by pyrrhotite. Arsenopyrite and loellingite are important components over restricted areas. Lenses and beds of pure quartz, likely derived through recrystallization of chert, make up a small proportion of the rock. Conformable, typically thin zones of chlorite schist and abundant, relatively late, discordant quartz veins also occur within the ore zones (Kerswill and others, 1983). In contrast to the B-Zone deposit, which is described in the next section, neither carbonate-facies nor oxide-facies iron-formation has been recognized at Lupin. Although regionally there are volcanic rocks that underlie the turbidite succession hosting the Lupin orebody, no clastic volcanics have been identified in the immediate vicinity of the mine.

The modes of occurrence of gold at Lupin have been described by Kerswill and others (1983).

> Gold at Lupin occurs as the native metal (Ag content about 14%) and is principally confined to sulphide-facies iron-formation. Two types of gold-bearing rock can be recognized. These are, 1) a widely and relatively uniformly distributed, arsenic-poor type containing abundant finely banded pyrrhotite but virtually no arsenic-bearing minerals, and 2) a more localized arsenic-rich type containing significant arsenopyrite (FeAsS) and loellingite ($FeAs_2$) that is clearly restricted to portions of the ore unit adjacent to late quartz veins and shear zones. The arsenides are typically intergrown with pyrrhotite in complex clots or porphyroblasts which decrease markedly in abundance and diameter as distance from the quartz veins and shear zones increases.
>
> Much of the gold in the arsenic-poor ore is reasonably uniformly disseminated as relatively large grains (50 microns) adjacent to pyrrhotite, but can also occur interstitially to silicates without close association with pyrrhotite. In the arsenic-rich ore gold is generally fine grained (20 microns or less) and is most abundant along arsenopyrite-loellingite grain boundaries. Some gold occurs as inclusions in the arsenides, and lesser amounts have been noted in quartz-rich inclusions and along micro-fractures in the arsenides. A modest amount of gold occurs as visible grains in the late quartz veins.

Bostock's statement that "gold (in the Itchen Lake area), so far as is known, is concentrated in the arsenic-bearing regions of the silicate-sulphide iron-formation facies" (Bostock, 1980) should be reconsidered in view of the above.

Gibbins (1981) and Kerswill and others (1983) consider that most of the features in the Lupin orebody are consistent with chemical sedimentation and syngenetic concentration of gold, silver, iron, sulfur and silica from hydrothermal fluids during deposition of the Lupin ore unit.

> Such features include the stratiform, laterally extensive, and relatively uniform grade distribution of the well-banded pyrrhotite-rich, but arsenic-poor ore, as well as the apparent lack of structural control and alteration associated with this ore type. Other features such as the restricted distribution of arsenic-rich ore, the presence of narrow chlorite-rich alteration zones adjacent to some quartz veins and the occurrence of vein-hosted gold indicate a significant epigenetic component related to formation of the quartz veins. Arsenic, silica and possibly some gold were introduced during this event, which probably accompanied the latest phase of a long-lived continuously evolving metamorphic and deformational regime. A multistage hypothesis best explains the varied styles of gold mineralization at Lupin. However, gold distribution was more closely controlled by lithology and sedimentary processes than by structure or metamorphism. (Kerswill and others, 1983).

Tremblay (1980), however, believes that the iron-formation at Contwoyto Lake is clastic in origin. He points out the following differences between the Contwoyto iron-formation and that of a deposit to which Lupin is often compared, the Homestake Mine of South Dakata. 1) Homestake is hosted in chemical sediments 2) Homestake has less iron and more combined magnesia and lime 3) Homestake mine-rocks exhibit a wide zone of hydrothermal alteration with abundant sulfides and quartz veins and stringers and widespread chloritization 4) Metamorphism at Homestake is less intense.

Exploration

Covello (1983) summarized exploration strategies for finding iron-formation-hosted gold in the Contwoyto Lake area. His recent exploration efforts on behalf of a consortium of Calgary and Vancouver-based companies were focused on the low-grade side of the greenschist-amphibolite metamorphic isograd. Techniques included reconnaissance and detailed geological mapping; geophysical surveying (Fraser-filtered VLF-EM, total field magnetometer, magnetic gradiometer and SP) and diamond drilling. His conclusions were as follows:

1) Anomalous concentrations of gold are found in silicate-sulphide iron-formation. Gold concentration appears to be bimodally distributed; most of the iron-formation contains from 0.1 to 0.3 g/t gold, some of the iron-formation contains from 1 to 15 g/t gold. The higher concentrations are associated with massive to disseminated sulfides, mainly pyrrhotite, but also arsenopyrite and minor pyrite.

2) Magnetic surveying, both total field and gradiometer, appears to be the best way to detect iron-formation, although anomalies caused by diabase dikes must be discriminated from those caused by iron-formation. The zero-gamma-per-meter gradiometer contour corresponded to a diabase dyke in one survey, and this might be useful empirically to discriminate between diabase dykes and iron-formation.

3) Fraser-filtered VLF surveying did not outline an iron-formation in one area, but gave a weak anomaly over an iron-formation in another area. A strong VLF conductor (without a coinciding magnetic anomaly) found in one area was caused by graphite.

4) S.P. surveys yielded moderate negative anomalies over iron-formation.

5) At one locale where metamorphic grade is probably lower than normal for this region, tuffaceous wacke was recognized as the hangingwall to the iron-formation. This is a departure from the Lupin model inasmuch as volcanics have not been recognized at Lupin. This iron-formation is also mineralogically unusual; comprising chlorite + amphibole + serpentine + pyrrhotite + pyrite + arsenopyrite. Garnets were not observed.

CURRENT WORK AND RESULTS

1982

Construction of all surface facilities was completed by March, and the 366-m-deep, three-compartment vertical shaft was completed by October. The mill and recovery plant were commissioned in April and the first gold bullion was poured on May 4th. Millfeed was initially supplied from stockpiled development ore. Commercial production at the 862 tpd mill was attained on October 1st; total cost of the project was $135 million. During 1982, about 200 kt of ore were milled and about 1,600 kg of gold recovered. Successful operations prompted a decision to expand the mill capacity to 1,034 tpd.

A major underground exploration and development program was begun in May to determine ore reserves between the 198-m and 390-m levels. When completed, total proven and probable reserves at Lupin were increased to 3.13 Mt of ore grading 13.58 g Au/t. Underground development in 1982 also included drifting on three future production levels at 170, 250 and 330 meters.

1983

Gold output was 3,670 kg from 323 kt of ore grading 12.0 g Au/t. The gold recovery rate, 94.3%, was slightly higher than anticipated. The project to increase the mill capacity by 20% from 862 tpd to 1,034 tpd was completed by the end of October, two months ahead of schedule, at a cost of $5.4 million. The average mill throughput in 1983 was 885 tpd. Mechanical problems with the surface crushing plant reduced mill throughput by 10% during the third quarter, but mill expansion included installation of a new rod mill that reduced the load on the crushing equipment. Other capital programs completed by year-end, at a cost of $5 million, included erection of two unheated storage buildings, installation of a 1.6-million-litre fuel tank, construction of yard areas to store consumables, and construction of an underground maintenance facility on the 170-m level. A 531-km winter ice road to the mine from the Ingraham Trail near Yellowknife was completed in February. The company's net saving by trucking 750 loads of freight (instead of airlifting) was $4.1 million.

Mine development included drifting of production sub-levels at 20-m intervals and haulage levels at the 87-m and 170-m levels (Fig. 2-12). Initial development was done on the 250-m and 330-m levels in both the Centre Zone and East Zone. By year-end, the sub-levels in the Centre Zone had been developed to the 170-m level and the ramp had been extended to that depth. Production in 1983 was mainly from the Centre Zone above the 87-m level. Mining of the East Zone above the 87-m level began by year-end. With additional ore reserves added by exploration and development during 1982, ore reserves at year-end to a depth of 400 m remained essentially unchanged from those of the previous year; 3.08 Mt at 13.58 g Au/t. Development in 1983 included 14,570 m of underground drilling, 2,329 m of lateral development and 164 m of raising (INAC, Mines and Mineral Statistics, Jan. to Dec., 1983).

One million dollars was spent on surface exploration in 1983. About 30% of this was spent on surface diamond drilling to test for extensions of the Lupin orebody. Of 29 holes drilled, seven intersected ore-grade gold across mineable widths, sixteen cut low-grade gold across widths that were less than mineable, and six intersected barren rock. Geological mapping and geophysical surveying were also done. About $250,000 dollars were spent to evaluate claims contiguous to the Lupin orebody and about $450,000 dollars were spent on regional exploration.

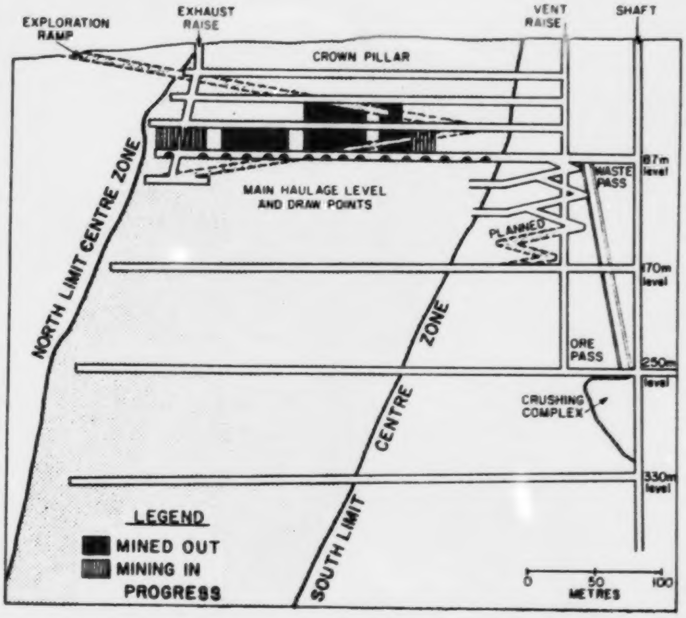


FIGURE 2-12: Idealized longitudinal section of Lupin Centre Zone showing development as of April, 1983 (from Echo Bay Mines Ltd. annual report, 1982)

B-ZONE MINE

Cullaton Lake Gold Mines Ltd.	Gold
(now Royex Gold Mining Corp.)	65 G/1,7,8
916 - 111 Richmond St. W.	61°17'N,98°31'W
Toronto, Ont., M5H 2G4	

REFERENCES

Eade (1966,1974); Hamilton (1981); Laporte (1983b); Lee (1959); Lord (1953); Page (1981); Wright (1967).

PROPERTY

Lease 3019 totalling 950 ha and comprising the following claims: AIR 1-12, 1 CEP claim, 13 DWE claims, GILT 1-15, 17-22, 25-29 and 1 SUE claim.

LOCATION

The claims are about 840 km east-southeast of Yellowknife, 400 km northwest of Churchill and 600 km north of Thompson. The property is accessible via a 1.5-km-long airstrip north of the mine that can accommodate Hercules aircraft. A lake about 300 m from the airstrip can accommodate float-equipped aircraft. Staging areas for aircraft are mainly Thompson and Churchill.

HISTORY

The bedrock and surficial geology of the mine area was mapped on a regional scale (1:1,000,000 and 1:500,000) by Lord (1953), Lee (1959) and Wright (1967). Reconnaissance-scale (1:250,000) geological mapping was done by Eade (1966, 1974) and a detailed study of the B-Zone deposit was undertaken by Page (1981).

The following historical information is mainly from Laporte (1983b). Prospectors exploring Prospecting Permit 17 (NTS 65 G/8) for Selco Exploration Company Ltd. in 1961 discovered boulders of gold-bearing quartz-magnetite iron-formation and staked the ANT 1-36 claims to cover the showings. The following year, Selco acquired Prospecting Permit 26 (NTS 65 G/7) and added the ANT 37-44 and JOE 1-8 claims before the permits expired in 1964-1965. Two zones of iron-formation, the A and B Zones, were identified on the claims and evaluated by geological mapping, geophysical surveying (magnetometer, EM and SP), geochemical surveying (lake water, peat and boulder sampling), trenching and diamond drilling between 1961 and 1964. Drill holes intersected erratically distributed concentrations of gold in the B-Zone along a strike length of 300 m, across a width of about 100 m and to a depth of about 100 m. The highest-grade intersection was 72 ppm gold across 1.2 m, and ore-grade intersections up to 3.6 m wide were reported.

The ANT and JOE claims lapsed and were restaked in 1972 as the GILT 1-15, 17-22 and 25-29 claims for Royex Mining Limited, Sturgex Mines Limited and Hewlet Mines Limited. O'Brien Gold Mines Limited purchased the Hewlet interest in 1973 and acquired additional claims from Selco. The DWE 1-3 claims were added to the property in 1973 and the DWE 4-13 and AIR 1-12 claims were added in 1974. Twenty-nine drill holes totalling 3313 m were drilled on the B-Zone in 1973. Road and airstrip construction and maintenance were done in 1974-1975, and a camp was built in 1976.

Under the terms of an option agreement granted to Consolidated Durham Mines and Resources Limited in 1975, a 2.45-m by 4.75-m decline was driven 106 m into the B-Zone in 1976. Bulk sampling and underground drilling in 1977 indicated probable and inferred potential of about 272 kt grading 38.7 g/t gold to a depth of about 120 m (O'Brien Energy and Res. Ltd. Annual Report, 1977). Preliminary leaching tests indicated that 70% to 80% of the contained gold could be recovered by vat or batch leaching. No further development work was done in 1978. The surface facilities were maintained and the decline was dewatered in 1979, at which time the interest in the project among the partner firms stood at:

79.4%	O'Brien Gold Mines Ltd. and Consolidated Durham Mines and Resources Ltd.
18.0%	Royex-Sturgex Mining Ltd.
2.6%	Selco Mining Corporation Ltd.

In 1980 the CEP and JOE claims were added to the property and Cullaton Lake Gold Mines Ltd. was formed to develop and operate the mine; O'Brien and Durham being the majority shareholders. Surface facilities were completed during 1980-1981 and a spiral ramp was driven to the 400-ft level. Production began in October of 1981, but start-up problems were experienced and only 14 kg of gold were produced that year.

DESCRIPTION

The B-Zone Mine lies within the Churchill Structural Province of the Canadian Shield in the Kaminak Subprovince, an Archean greenstone belt that extends from the Saskatchewan border to Rankin Inlet (Page, 1981). The stratigraphy of the Kaminak Subprovince is outlined in Table 2-12. The oldest rocks are intercalated volcanics and sediments of the Archean Henik Group, which is divisible into a lower, mainly volcanic unit and an upper, mainly clastic unit that is considered to be a turbidite sequence deposited in a subaqueous, eugeosynclinal environment (Page, 1981).

In the Cullaton Lake area, the Montgomery Lake Group of Table 2-11 is absent and the Henik Group is unconformably overlain by metasediments of the

TABLE 2-12 : STRATIGRAPHY OF THE KAMINAK SUB-PROVINCE SHOWING THE POSITION OF THE B-ZONE AND SHEAR LAKE GOLD DEPOSITS (from Page, 1981)

TIME			GROUP	LITHOLOGY	
CENOZOIC					Moranic Material; Sand, Silt, Clay
PRECAMBRIAN	PROTEROZOIC	HELIKIAN		INTRUSIVES	Gabbro Dykes
					Granite
					Granite, Quartz Monzonite, Granodiorite
		APHEBIAN	HURWITZ GROUP	CLASTICS	Quartzite, Arkose, Argillite, Minor Dolomite
					Intrusive Gabbro Sills
					Impure Quartzite, Arkose, Dolomite
					Greywacke, Siltstone
					Dolomite, Argillite, Siltstone, Iron Formation
					Slate, Shale, Siltstone, Greywacke
					Orthoquartzite, Arkose
					Boulder Conglomerate, Greywacke
			MONTGOMERY LAKE GROUP	CLASTICS	Siltstone
					Quartzite, Greywacke
				✪ SHEAR LAKE	Boulder Conglomerate
	ARCHEAN			INTRUSIVE & METAMORPHOSE SEQUENCE	Gabbro, Metagabbro Dykes
					Granodiorite, Quartz Diorite, Monzonite
					Granodiorite Gneiss, Granite Gneiss
					Quartz Feldspar Biotite Schist & Gneiss
					Hornblende-Chlorite Schist & Gneiss
			HENIK GROUP	CARBONATES	Dolomite
					Metadolomite
				CLASTICS	Greywacke
					Argillite
					Phyllite Tuff
				✪ B-ZONE	Banded Iron Formation
				VOLCANICS	Minor Rhyolite
					Basalt
					Andesite

Aphebian Hurwitz Group (Fig. 2-13), which hosts the Shear Lake deposit (refer to Table 2-1). The rocks of the Henik Group have been metamorphosed to lower greenschist facies and are preserved in a basinal structure that has undergone two periods of folding and faulting. The most extensive deformation occurred during the Hudsonian Orogeny when strata were drawn into folds with north-northwest-trending axes and west-dipping limbs.

The following description is mainly from Laporte (1983b). The B-Zone deposit is a 75-m to 125-m-thick and 250-m-long segment of a discontinuous iron-formation that has been traced for 2400 m in greywacke, argillite and thin pillowed lavas of the Archean Henik Group. Four facies of iron-formation are present in the area (Page, 1981). Carbonate facies, 76 m to 91 m thick, overlies the oxide, silicate and sulphide facies and is composed of chert, sericite, at least 15% ferroan dolomite and minor euhedral pyrite and pyrrhotite. Precious metal content is 0.01 to 0.10 ppm Au and 0 to 1.0 ppm Ag. The carbonate facies iron-formation consists mainly of ellipsoidal chert/carbonate nodules, 2.5 to 4 cm long, in a fine-grained matrix of sericite and carbonate, but locally it consists of undeformed, fine-grained laminae that may enclose thin argillaceous bands. The silicate facies is 30 cm to 6.1 m thick and grades into oxide facies. It consists of chert/ankerite nodules in a fine-grained matrix of chlorite, stilpnomelane, minnesotaite and siderite. This facies contains 0.10 to 1.5 ppm Au and 0 to 1.0 ppm Ag. The oxide facies texturally resembles the silicate facies with chert/siderite nodules in a fine-grained magnetite-chlorite-siderite matrix. Locally the facies consists of alternating chert and magnetite-rich layers. Minor ankerite is associated with the cherty intervals and the magnetite-rich layers consist of octahedral grains of magnetite in a fine-grained matrix of iron silicates and siderite. The oxide facies is 6 m to 45.7 m thick and contains 0.01 to 2.0 ppm Au and less than 1.0 ppm Ag.

The gold is in the sulphide facies, which ranges in thickness from 61 cm to 17.4 m and occurs within or bordering the oxide facies. Pyrrhotite, pyrite, and minor arsenopyrite and chalcopyrite form 5% to more than 20% of the rock. Magnetite, siderite, iron silicates and the sulphides form iron-rich units crudely layered with chert. Gold grains, 3 to 10 micrometres wide, occur within the non-metallic gangue minerals and along the sulphide grain boundaries. Little gold is enclosed in the sulphide grains and no one sulphide can be used as an indicator of the presence of gold. The sulphide facies contains 1.0 to 200 ppm Au and 2 to 25 ppm Ag.

Analysis of drill sections, in which the rocks are only divided into greywacke, quartz-carbonate-chlorite and quartz-magnetite iron-formation, indicates that the iron-formation is intensely folded and ranges from 3 m thick at 29+50 N to 60 m thick at 25+50 N (Fig. 2-14). The north-northwest-trending iron-formation is near vertical at surface, but gradually flattens out and dips 60° west at the 400-ft level. Three shallowly dipping, northwest-trending normal faults dissect the iron-formation in the area of the B-Zone. These low-angle faults and the iron-formation are in turn displaced along steeply dipping, east-northeast-trending strike-slip hinge faults. Movement along the strike-slip faults ranges from right lateral near surface, to left lateral at the 300-ft level (section 27+00 N), to right lateral at depth.

Page (1981) reviewed theories on the origin of

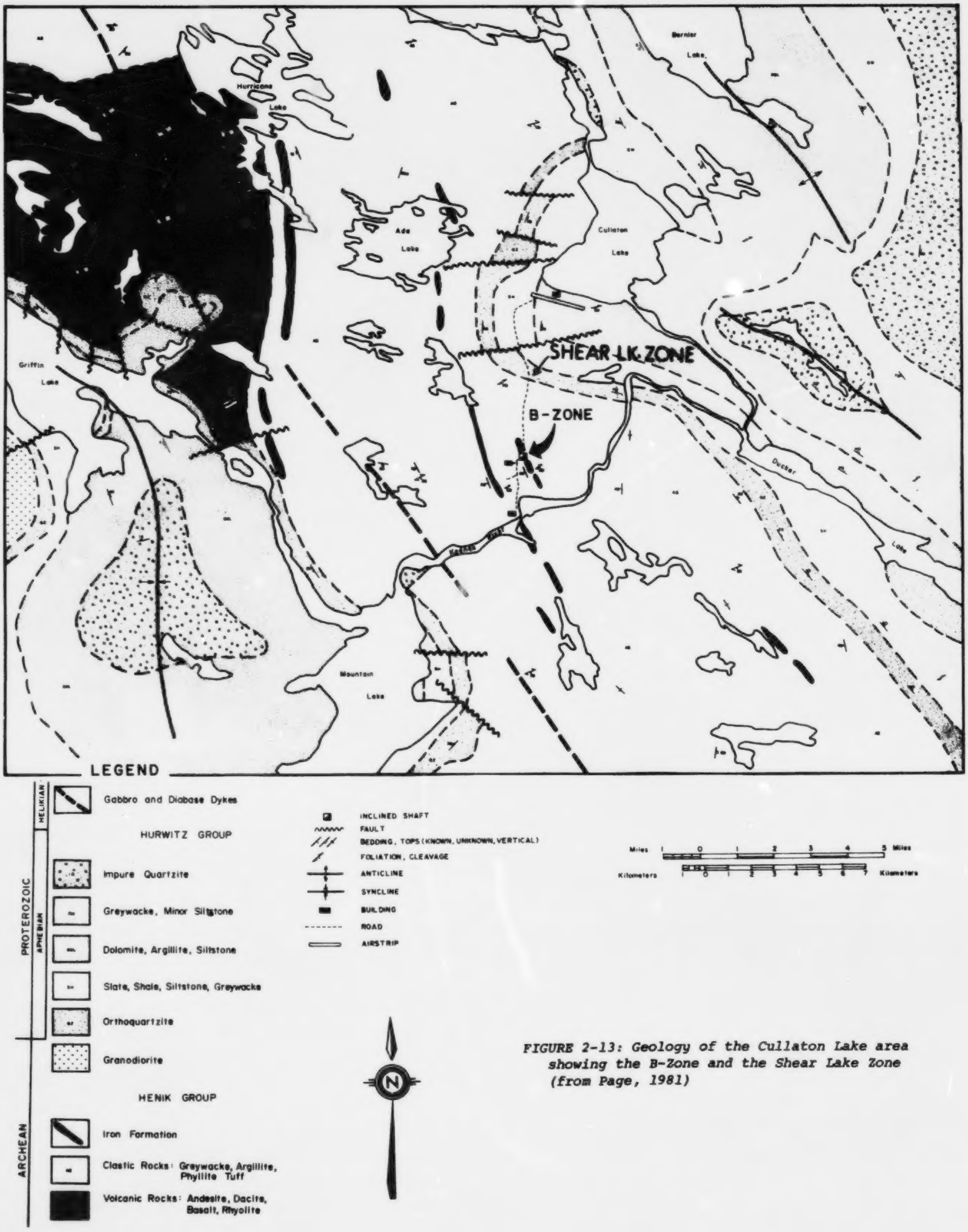

Hurricane Lake
Bernier Lake
Ada Lake
Cullaton Lake
Griffin Lake
SHEAR LK. ZONE
B-ZONE
Ducker Lake
Mountain Lake
LEGEND
HELIKIAN
Gabbro and Diabase Dykes
PROTEROZOIC
APHEBIAN
HURWITZ GROUP
Impure Quartzite
Greywacke, Minor Siltstone
Dolomite, Argillite, Siltstone
Slate, Shale, Siltstone, Greywacke
Orthoquartzite
Granodiorite
ARCHEAN
HENIK GROUP
Iron Formation
Clastic Rocks: Greywacke, Argillite, Phyllite Tuff
Volcanic Rocks: Andesite, Dacite, Basalt, Rhyolite
INCLINED SHAFT
FAULT
BEDDING, TOPS (KNOWN, UNKNOWN, VERTICAL)
FOLIATION, CLEAVAGE
ANTICLINE
SYNCLINE
BUILDING
ROAD
AIRSTRIP
Miles 1 0 1 2 3 4 5 Miles
Kilometers 1 0 1 2 3 4 5 6 7 Kilometers
N

FIGURE 2-13: Geology of the Cullaton Lake area showing the B-Zone and the Shear Lake Zone (from Page, 1981)

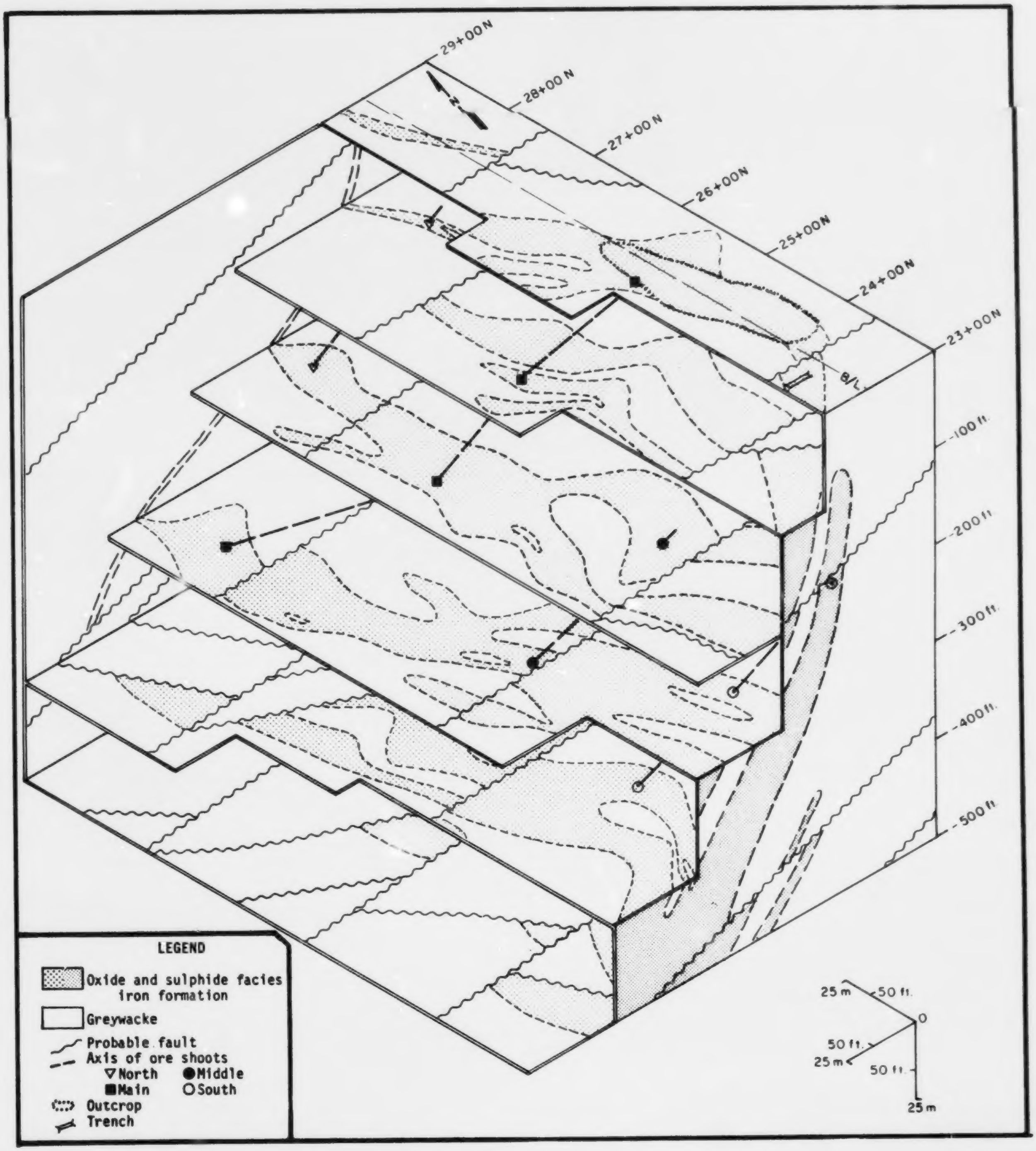

29+00N
28+00N
27+00N
26+00N
25+00N
24+00N
23+00N
N
B/L
-100 ft.
-200 ft.
-300 ft.
-400 ft.
-500 ft.
LEGEND
Oxide and sulphide facies iron formation
Greywacke
Probable fault
Axis of ore shoots
▽North
●Middle
■Main
○South
Outcrop
Trench
25 m
50 ft.
0
50 ft.
25 m
50 ft.
25 m

FIGURE 2-14: Isometric diagram of the B-Zone oxide and sulfide facies iron-formation (from Laporte, 1983)

Archean iron-formations and postulated that the association of the B-Zone iron-formation with an eugeosynclinal environment supports an exhalative concept of formation. He suggests that hydrothermal solutions transported the gold as chloride or sulphide complexes and that the gold was precipitated as a consequence of changing physiocochemical conditions such as temperature, pressure, pH, oxygen fugacity and sulfur activity. He cites examples of modern hot springs in New Zealand where precipitates of sulfide and opaline silica contain up to 85 ppm gold and compares the B-Zone deposit to other Archean iron-formation-hosted gold deposits such as the Homestake Mine in South Dakota and the Pickel Crow Mine in Northwestern Ontario.

CURRENT WORK AND RESULTS

Start-up problems experienced in 1981 were gradually resolved after management of mining operations was taken over by Camchib Resources Incorporated in May of 1982. Gold recoveries increased from about 60% in June to about 95% in December. Although mill throughput gradually increased, the average for 1982 was still only 66% of the mill's 272-tpd design capacity. Ore grades were not as high as anticipated, resulting in a downward recalculation of ore reserves at year-end (Table 2-13).

The B-Zone Mine was officially deemed to have attained commercial production at the beginning of 1983, a year in which the mill operated at design capacity and sufficient new reserves were outlined to replace the ore mined (Table 2-13).

Mine development during 1982-1983 included about 550 m of drifting (Fig. 2-15) to extend mine workings to the north and south along the strike of the iron-formation and to probe deeper levels of the deposit.

Cullaton expects to increase gold production by about 600 kg to about 1800 kg of gold per year. About 360 tpd of millfeed is expected in the future from the Shear Lake Mine, 5 km north of B-Zone. Processing changes and modifications of the mill are being tested to accommodate a blend of Shear Lake and B-Zone ores. For more information on Shear Lake, refer to the introduction to this chapter as well as Table 2-1 and Chapter 5. Additional information on the extensive exploration done by Cullaton in the area can be found in Chapter 5 under the heading Cullaton Lake Project.

TABLE 2-13: PRODUCTION AND RESERVES, B-ZONE MINE 1981-1983

	PRODUCTION		RESERVES	
Year	kt Mined	kg Au Recv'd	kt Reserves	g Au/t
1981	9	14	278	25.0
1982	66	695	150	17.0
1983	102	1147	154	17.1

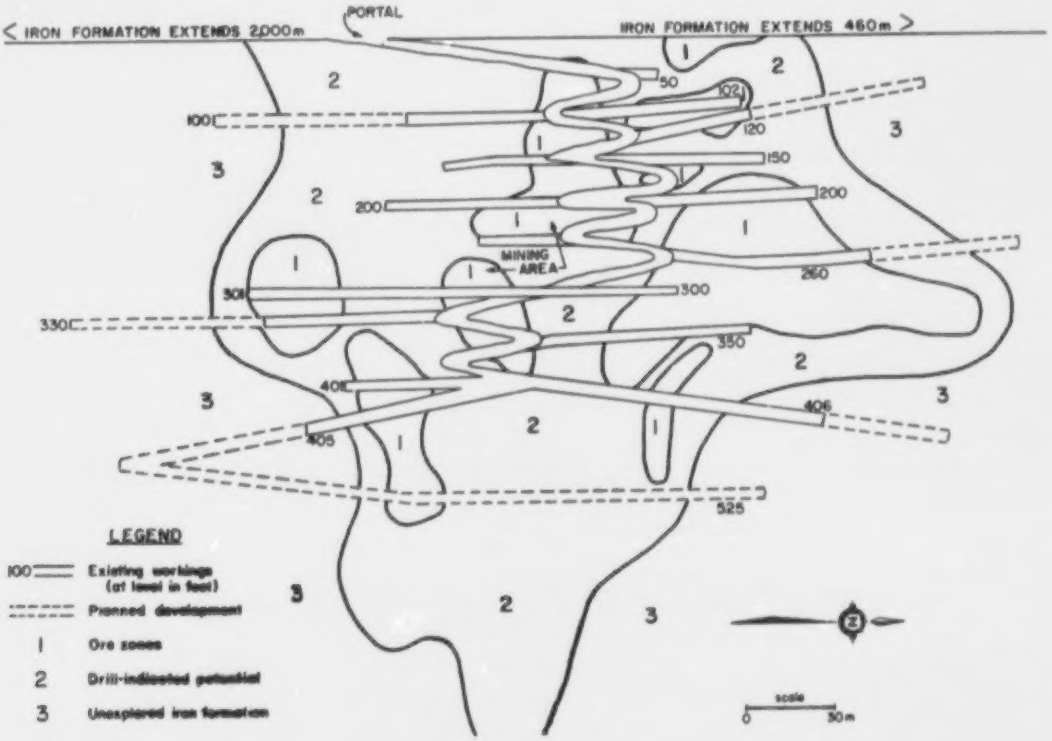

PORTAL
< IRON FORMATION EXTENDS 2000m
IRON FORMATION EXTENDS 460m >
50
102
100
120
150
200
260
300
301
330
350
400
405
406
525
MINING AREA
1
2
3
LEGEND
100 Existing workings (at level in feet)
Planned development
1 Ore zones
2 Drill-indicated potential
3 Unexplored iron formation
N
scale
0
30m

FIGURE 2-15: Idealized longitudinal section of B-Zone showing mine development and the disposition of ore zone (from annual report, Cullaton Lake Gold Mines, 1983)

SILVER MINES: ELDORADO, SILVER BEAR (NORTH), HOREX AND SMALLWOOD

INTRODUCTION

The Eldorado, Silver Bear (North), Norex and Smallwood mines are in the northern half of the Aphebian Great Bear Volcano-Plutonic Complex in the Bear Structural Province (Fig. 2-16). This complex, which has also been called the Great Bear Batholith and the Great Bear Magmatic Zone, comprises a "multitude of gregarious plutons, mostly biotite- and hornblende-bearing, that intrude their own volcanic cover. All of the non-plutonic rocks in the Great Bear Magmatic Zone are termed the McTavish Supergroup" (Hildebrand, 1983). The McTavish Supergroup is up to 10 km thick and has been metamorphosed under sub-greenschist facies conditions; folded about gently plunging, northwest-trending axes; intruded by tabular to sheetlike epizonal granitoid plutons and cut by a series of northeast-trending, right-lateral strike-slip faults. The McTavish Supergroup has been subdivided into three groups separated by unconformities. In ascending order, these are the Labine, Sloan and Dumas Groups. The Labine Group, which hosts all the silver deposits in the Echo Bay and Rainy Lake mining camps (Fig. 2-17), is an early Proterozoic volcanic arc developed upon continental crust (Hildebrand, 1981a).

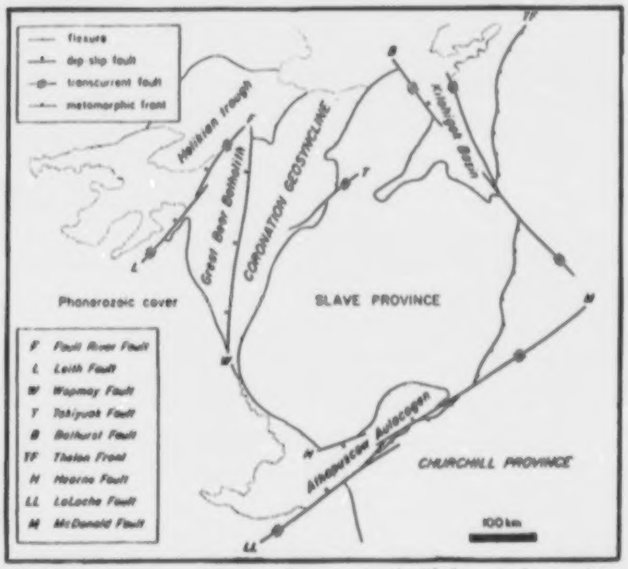

fissure
dip slip fault
transcurrent fault
metamorphic front
Hellikian trough
Great Bear Batholith
CORONATION GEOSYNCLINE
Kilohigok Basin
Phanerozoic cover
SLAVE PROVINCE
Athapuscow Aulacogen
CHURCHILL PROVINCE
100km
F Fault River Fault
L Leith Fault
W Wopmay Fault
T Takiyuak Fault
B Bathurst Fault
TF Thelon Front
H Hearne Fault
LL LaLoche Fault
M McDonald Fault
F
L
W
T
B
TF
H
LL
M

FIGURE 2-16: Great Bear Batholith and other structural elements of the Northwest Canadian Shield. Dotted lines are the shores of Great Slave Lake, Great Bear Lake, and the Arctic coastline (from Hoffman and McGlynn, 1977)

The Echo Bay Mining Camp includes the Eldorado, Contact Lake, Echo Bay, Bonanza and El-Bonanza silver mines, none of which are presently operating, although the Eldorado Mine of Echo Bay Mines Limited produced a small quantity of silver during the first quarter of 1982 (Tables 2-1, 2-2). Because of the limited activity at Eldorado during the period under review (1982-1983), Eldorado will not be described in this volume; refer to the previous Mineral Industry Report (Brophy, 1984) for a detailed description.

The Rainy Lake Mining Camp (also referred to as the Conjuror Bay or Camsell River mining camp) includes the Silver Bear (North), Norex, Smallwood and Northrim mines. All of these mines except Northrim were active during 1982-1983.

The volcano-sedimentary belts that host the silver deposits of the Echo Bay and Camsell River

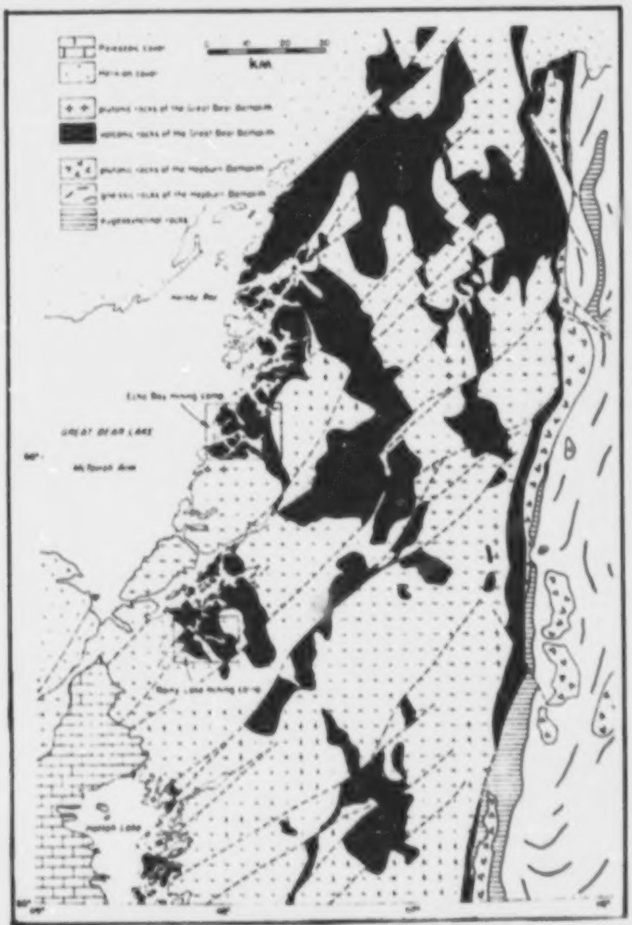

km
Echo Bay mining camp
GREAT BEAR LAKE
McTavish Arm
Rainy Lake mining camp

FIGURE 2-17: Geology of the north half of Great Bear Batholith showing the Echo Bay and Rainy Lake (or Camsell River) mining camps, which include all of the silver mines in the area (from Hoffman and McGlynn, 1977)

mining camps once were contiguous, but are now offset by about 30 km along a series of northeast-trending, right-lateral strike-slip faults (Fig. 2-17). The silver deposits are spatially associated with a suite of epizonal, comagmatic, hornblende monzonite-syenodiorite-syenite plutons. The Contact Lake deposit and parts of the Silver Bear deposit are in this plutonic suite; most of the other deposits are within one kilometer of the contact. Field relations and sulfur isotope studies indicate that the deposits are of magmatic-hydrothermal origin (Badham, 1975). Silver-bearing veins are typically polymetallic and are localized in dilational zones developed by repeated movement on bent or splayed northeast-trending faults and related, east-trending cross-faults.

SILVER BEAR (NORTH), NOREX AND SMALLWOOD MINES

Terra Mines Ltd.
#202, 7608 - 103 St.
Edmonton, Alta., T6E 4Z8

Silver
86 E/9, 86 F/12
65°35'N to 65°36'N
117°57'W to 118°06'W

REFERENCES

Badham (1972, 1973a, 1973b, 1975); Badham and Morton (1976); Brophy (1984); Hildebrand (1980a, 1981b, 1983); Hoffman and McGlynn (1977); Padgham and others (1974); Shegelski and Murphy (1973); Shegelski and Thorpe (1972).

PROPERTY

The Silver Bear Mine (86 E/9) is on mining lease 2335, which covers 179 ha and comprises claims A 1-2, A 5-9 and A 14-15. The Norex and Smallwood mines (86 F/12) are on mining lease 2345, which covers 87 ha and comprises claims ITLDO 2-7.

LOCATION

The Silver Bear mine is immediately south of the Camsell River, 405 km north-northwest of Yellowknife. It is serviced by a gravel airstrip. Norex and Smallwood are about 10 km to the east-southeast and are connected to the mill at Silver Bear by an all-weather gravel road.

HISTORY

The Silver Bear Mine is on property staked in the 1940's as the YAW group and drilled in the 1960's by Eldorado Mining and Refining Limited and Echo Bay Mines Limited. The ground was restaked as the A group in 1966 and acquired by Silver Bear Mines Limited, the assets of which were taken over by Terra Mines Limited the following year. Mining commenced at Silver Bear in 1969 after considerable underground development and completion of a 270 tpd mill capable of producing separate Ag-Bi and Cu-Ag concentrates. The North Mine was discovered in 1976 when deep drilling intersected ore beneath the Camsell River. A crosscut was driven northerly on the 600-foot level of the Silver Bear Mine to gain access to the North Mine, which began production in 1979.

The Norex Mine is on property staked as the Elite claims in 1932 and restaked as the ITLDO claims in 1960. Caesar Silver Mines Ltd. was formed in 1967 to develop the property. The claims were optioned to Norex Resources Limited in 1969 after surface drilling and limited underground development had outlined ore in a silver-bearing vein, the Graham Vein. Open-pit mining began in 1970 after completion of a 45 tpd test mill. In 1971 a decline was started and surface drilling completed to probe the Graham Vein at depth. Terra Mines Limited acquired a 50% interest in the Norex property in 1972 and began hauling stockpiled ore by ice road to the Terra mill. By 1974 a gravel road connecting Norex to Silver Bear was completed. The decline to the Graham Vein was completed in 1977 and stopes were worked on the 160-foot and 300-foot levels. The most productive years at Norex were 1977 and 1978, when almost 38,000 kg of silver were won from only 14.3 kt of ore (Terra Mines Ltd. Annual Reports, 1977 & 1978). In 1980, Terra purchased the 50% interest held by Norex and became sole owner of the property.

The Smallwood Mine was discovered in 1978 after surface drilling outlined ore about 760 m southeast of the Norex workings. A decline into Smallwood was advanced 517 m by the end of 1979.

During 1980 and 1981, production at all of the Terra mines was sharply curtailed as emphasis was shifted to exploration and development. Only 28 kt of ore were mined and 11,000 kg of silver produced, compared to 60 kt mined and 60,000 kg produced during the previous two years. Almost all of 1980 and 1981 production was from the Silver Bear Mine.

DESCRIPTION

The Camsell River silver deposits are in volcanic and sedimentary rocks of the Labine Group. The following summary of the geological evolution of the

TABLE 2-14: TABLE OF FORMATIONS, RAINY LAKE AREA (from Hildebrand, 1983)

late Proterozoic					
			Gunbarrel Gabbro		coarse grained gabbro
			intrusive contact		
early Proterozoic					
			Cleaver Diabase		altered diabase dykes
			intrusive contact		
GREAT BEAR MAGMATIC ZONE			**Hooker Megacrystic Granite**		k-feldspar megacrystic granite
			intrusive contact		
			Grouard Porphyries		plagioclase-hornblende-quartz-biotite-k-feldspar porphyritic dykes
			intrusive contact		
			plagioclase porphyry		
			intrusive contact		
			quartz diorite		fine grained quartz diorite
			intrusive contact		
			kqp porphyry		k-feldspar-quartz-plagioclase porphyry
			intrusive contact		
	LABINE GROUP		**"younger ash-flow tuffs"**		simple cooling units of dacite rhyolite ash-flow tuff
			Animal Andesite		andesite lavas and breccias
			relations uncertain		
		CLUT CAULDRON COMPLEX	**Calder Quartz Monzonite**		hornblende-biotite quartz monzonite
			intrusive contact		
			Uranium Point Formation		sandstone, conglomerate, lapilli tuff, mudstone, ashstone
			White Eagle Tuff		lithic and crystal-rich dacite ash-flow tuff
				mesobreccia member	breccia
			unconformity		
		"EARLY INTERMEDIATE INTRUSIVE SUITE"	**Balachey Pluton**		mainly quartz monzonite
			Rainy Lake Intrusive Complex		monzodiorite, monzonite, pseudosyenite
			intrusive contact		
		BLACK BEAR CAULDRON COMPLEX	**Camsell River Formation**		andesitic lavas, breccias, ash-flow tuff, sandstone, mudstone, conglomerate
			Terra Formation		mudstone, sandstone, limestone, breccia, rhyolite flows, ashstone
			Moose Bay Tuff	ash-flow tuff member	rhyolitic ash-flow tuff, andesite, sandstone
				lower member	sandstone,mudstone, breccia, andesite, limy argillite
			unconformity		
			unnamed sills		gabbro, diabase.
			intrusive contact		
			unnamed dykes		plagioclase, quartz, k-feldspar porphyritic dykes
			intrusive contact		
			Bloom Basalt		pillow basalt, breccia, tuff,dolomite
			Conjuror Bay Formation	upper member	mudstone, ashflow tuff, breccia
				lower member	quartz arenite
			unconformity		
HOTTAH TERRANE			**unnamed granitoid intrusions**		deformed diorite, granodiorite, quartz monzonite
			Holly Lake metamorphic suite		deformed metasedimentary rocks

Labine Group in the vicinity of the mines is drawn from Hildebrand (1983). The oldest rocks, mature crossbedded arenite of the Conjuror Bay Formation (Table 2-14), are overlain by voluminous pillow basalts, associated breccias and aquagene tuff, possibly erupted during a period of extension. A period of uplift was succeeded by subaerial ash-flow eruptions that led to cauldron collapse (Black Bear Cauldron, Table 2-14). Two km of tuff (Moose Bay Tuff) ponded in Black Bear Cauldron, after which the cauldron became the site for fluvial and lacustrine sedimentation (Terra Formation) and then for andesitic volcanism (Camsell River Formation). The Balachey Pluton and the Rainy Lake Intrusion, which are distinctive, sheet-like quartz monzonite-monzodiorite bodies related to the andesitic lavas, were then intruded. These plutons altered their wall rocks to distances of greater than 1 km as they cooled by hydrothermal convection.

The main structure in the vicinity of the mines is the northwest-trending, gently northwest-plunging Norex Syncline (Hildebrand, 1983), which is cored by volcanic and sedimentary rocks of the Labine Group and is flanked to the southwest by the Rainy Lake Intrusion and to the northeast by the Balachey Pluton. The area is cut by numerous northeasterly trending, right-lateral strike-slip faults. The Silver Bear, Norex and Smallwood mines are associated with these faults (or related cross faults) and are within Labine Group rocks that are close to the contacts of the Rainy Lake Intrusion or the Balachey Pluton.

The Silver Bear Mine is on the southwest limb of the Norex Syncline near the north boundary of the Rainy Lake Intrusion. It is hosted in the Terra Formation (formerly the Arden Formation of Hildebrand, 1981b), which consists of an upper member comprising lithic arkose, calc-argillite, conglomerate, siltstone and mudstone, and a lower member comprising mudstone, breccia, cherty tuff, lapilli tuff, siltstone and limey mudstone (Hildebrand, 1981b). Most ore is in the upper member, which in the mine area contains more than 10% banded and disseminated sulfides; mainly pyrite, pyrrhotite and chalcopyrite, but also argentite, Co-Bi arsenides, native silver and native bismuth. The banded and disseminated sulfides, too low grade to constitute ore, serve as a useful guide for exploration since silver-bearing veins are commonly in the sulfide-rich zones.

Ore is concentrated in steeply to moderately south-dipping, northeast - striking quartz-carbonate-hematite vein systems that cut the banded sulfides. The veins, which are usually less than 1 m wide, are related to an east-northeast-trending splay from a major northeast-trending fault to the west. The veins are composite and complex, containing silver-bearing pods surrounded by a thin halo of silicic, hematitic, chloritic and carbonate alteration (Badham, 1975). Associated minerals include skutterudite, safflorite, rammelsbergite, pararammelsbergite, matildite and sphalerite. Ore is also found in thin gash veins that trend north to northeast and dip steeply west. Recently, ore-bearing veins have been found in fractures in the syenite to the south.

The North Mine lies immediately north of Silver Bear and is in the Camsell River Formation, a series of andesitic to basaltic flows, tuffs and breccias that overlie the Terra Formation. Silver-bearing veins are associated with a fault that underlies the Camsell River. The veins strike easterly and dip 70^{o}-80^{o} south.

Both the Norex Mine and the Smallwood Mine, which is 3/4 km southeast of Norex, are on the northeast limb of the Norex Syncline within a kilometer of the Balachey Pluton contact. They are hosted in andesitic flows and ash flow tuffs of the Camsell River Formation (Fig. 2-18). These country rocks are fractured, chloritized, albitized and locally impregnated by iron, lead and zinc sulfides. Ore-bearing veins at Norex (and at Smallwood?) are emplaced in easterly trending tension fractures between two major northeasterly trending faults.

The Graham Vein at Norex is the principal of five steeply dipping, east-southeast-trending quartz-carbonate veins occupying a 100-m-wide zone of chlorite-epidote alteration. The Graham Vein is about 200 m long and is generally less than 1 meter wide. Ore lenses in dilational parts of the vein contain native silver, native bismuth, hematite and a variety of sulfides and arsenides. According to Blackwell (1974), the mineral suite is comparable to that of the nearby mines, but the ore appears to be more siliceous and to contain less carbonaceous, uraniferous, phosphatic and antimony-rich mineral"

At the Smallwood Mine, a number of silver-bearing veins cut sulfide-rich altered tuff and andesite. One of them, the No. 4 Vein, is longer and wider, but lower grade, than other silver-bearing veins found in the area. Its occurrence in a 5-m-wide fracture zone distinguishes it from other productive veins.

CURRENT WORK AND RESULTS

Production resumed in the second quarter of 1982 after a hiatus in 1981 when activities focused on exploration and development. Production from the Terra-operated mines between 1976 and 1983 is summarized in Table 2-15, which shows that record tonnage was milled and near-record silver output was obtained in 1983. The average grade of the ore, however, was only about half that of the earliest years of operation. Installation of a new ball mill late in 1983 doubled the mill capacity from 180 to 360 tpd. It is anticipated that this expansion will reduce energy costs in 1984 without sacrificing output; the same amount of ore will be processed using only half the usual milling time.

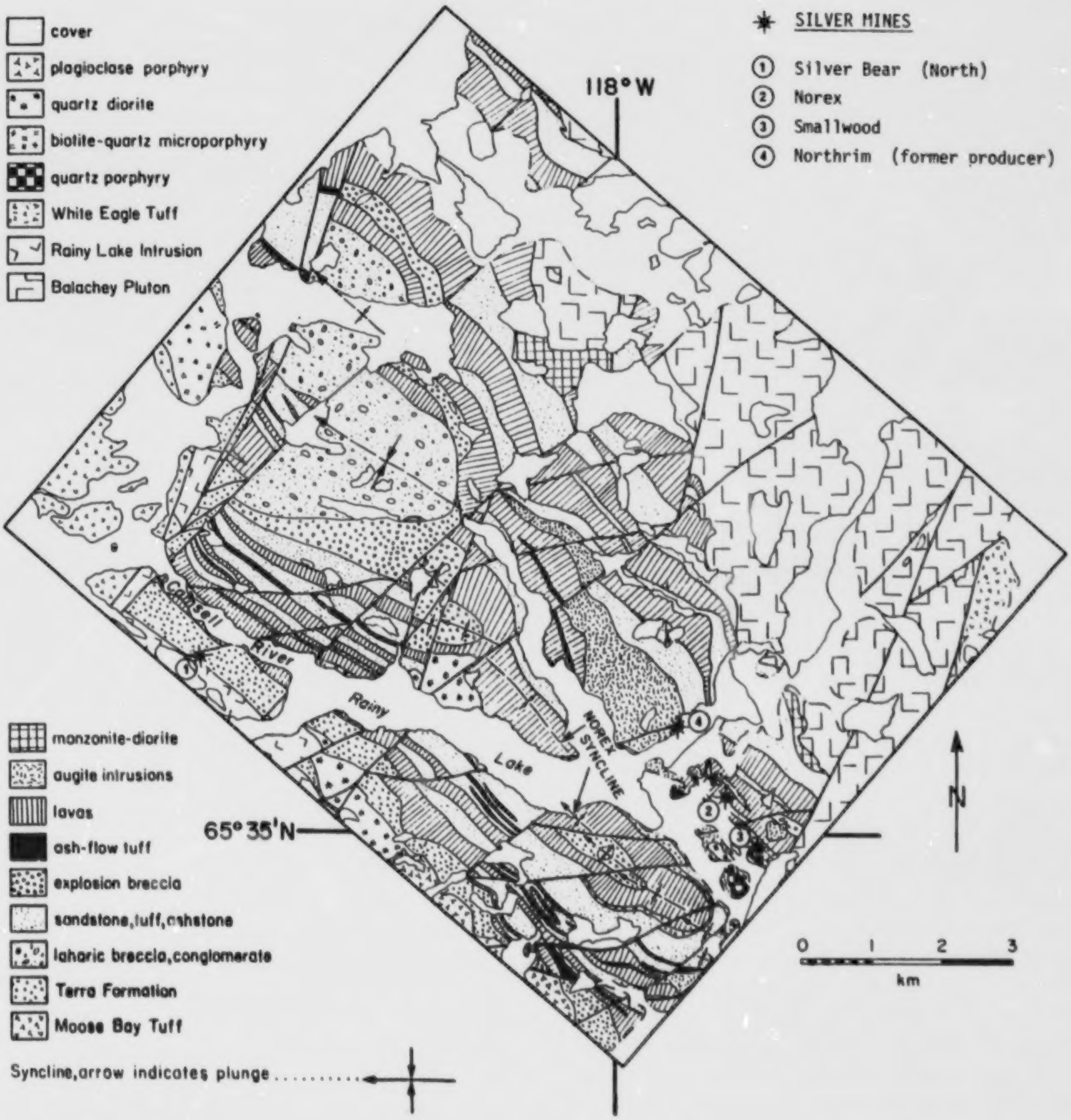

cover
plagioclase porphyry
quartz diorite
biotite-quartz microporphyry
quartz porphyry
White Eagle Tuff
Rainy Lake Intrusion
Balachey Pluton
SILVER MINES
① Silver Bear (North)
② Norex
③ Smallwood
④ Northrim (former producer)
118° W
Camsell River
Rainy Lake
NOREX SYNCLINE
65° 35'N
monzonite-diorite
augite intrusions
lavas
ash-flow tuff
explosion breccia
sandstone, tuff, ashstone
laharic breccia, conglomerate
Terra Formation
Moose Bay Tuff
Syncline, arrow indicates plunge
N
0 1 2 3
km

FIGURE 2-18: Generalized geological map of the Camsell River area showing silver mines and the complex facies relationships between various rock types in the Camsell River Formation (from Hildebrand, 1983)

TABLE 2-15: PRODUCTION, TERRA OPERATIONS, 1976 to 1983

YEAR	*kt Mined*	*kg Ag Recv'd*	*% Split**	*kg Ag/t*
1976	41.5	58000	100/00/00	1.40
1977	33.2	45900	70/30/00	1.38
1978	33.6	46000	48/52/00	1.37
1979	26.9	13700	88/12/00	0.51
1980	27.9	9700	95/05/00	0.35
1981	?	1800	100/00/00	?
1982	36.6	26717	75/18/07	0.73
1983	72.2	46654	**59/37/04	0.65

**percent of silver production from each of the mines... Silver Bear/ Norex/ Smallwood*

data from 1983 Terra Mines annual report and Mining Inspection Service, Gov't NWT.

***this data is from the 1983 Terra annual report. Mining Inspection Service data shows a higher percentage of the split from Silver Bear.*

Silver Bear (North)

Most of Terra's silver output in 1982 and 1983 came from the Silver Bear Mine, mainly from previously developed workings that were re-examined and found to be productive. The following development at Silver Bear during 1982-1983 was reported to the Mining Inspection Service, Gov't of the NWT: lateral advance 1400 m, raising 850 m, underground drilling 8080 m and surface drilling 1180 m. Development took place on 11 of the mine's 13 levels (levels are about 30 m apart), but about 65% of the lateral advance was on the first 5 levels.

In the North Mine, drilling outlined 1 kt of ore grading 1.4 kg Ag/t. It was reported that this tonnage would be mined by the end of 1982 (pers. comm., Barry Way, former mine geologist).

Norex

About 22% of Terra's silver output in 1982-1983 was from the Norex Mine, which produced during the last quarter of 1982 and during the first and last quarters of 1983. Intervening times were spent mainly on development; an incline was driven to intersect an ore-vein (No. 3 Vein) discovered during drilling in 1981, and a decline was driven to open up a fifth level (levels are about 30 m apart). The following development during 1982-1983 was reported to the Mining Inspection Service, Gov't of the NWT: lateral advance 2342 m, incline 21.5 m, decline 112 m, raising 916 m, surface drilling 6257 m and underground drilling 12,800 m. Much of the drilling in 1983 was to follow up two previously obtained drill intersections about 8 m apart at a depth of 244 m below surface; one grading 6.9 kg Ag/t across 3.8 m and the other 1.4 kg/t Ag across 1.5 m.

Smallwood

The Smallwood Mine accounted for about 5.5% of Terra's silver output during 1982-1983. Production at Smallwood commenced during the last quarter of 1982, but development was the main focus during the period under review. The following development during 1982-1983 was reported to the Mining Inspection Service, Gov't of the NWT: lateral advance 1886 m, decline 275 m, raising 614 m, underground drilling 6246 m and surface drilling 9708 m. At least 750 m of advance was through country rock grading 0.3% Cu and 13.7 g Ag/t (personal communication, Barry Way, former mine geologist). In addition, appreciable sphalerite and galena were observed; one sample of altered tuff collected underground had at least 5% finely disseminated sphalerite.

Prospecting and soil sampling were conducted in the vicinity of Smallwood and Norex in 1982. Soils were analyzed for silver, copper, cobalt, bismuth, lead, zinc and nickel. Survey results are not known.

ZINC-LEAD MINES: PINE POINT, POLARIS AND NANISIVIK

INTRODUCTION

Pine Point, Nanisivik and Polaris are considered to be Mississippi Valley-type (MVT) deposits, the characteristics of which have been described by Ohle (1959), Brown (1970), and more recently by Anderson and Macqueen (1982).

1. The deposits occur mainly in dolostone
2. The dominant ore minerals are sphalerite and galena, the former usually predominating
3. Ores are relatively lean in precious metals
4. Sphalerite is usually of low iron content
5. Sphalerite and galena are coarsely crystalline, especially in cavities that are abundant in this type of deposit
6. Host rocks are generally not regionally metamorphosed
7. The ores are mainly stratabound
8. Igneous activity is minor or lacking
9. Ores were formed at low temperatures, in the range of 100-150^{0}C
10. Most deposits are in Paleozoic rocks

11. Most deposits are found at or near the edges of basins as presently preserved, or on arches between basins
12. Individual deposits tend to cluster in districts that may be distributed over hundreds of square kilometres, which argues against strictly local sources for metal and sulfur
13. Most deposits are in relatively undisturbed platformal carbonates, or within foreland fold and thrust belts
14. Deposits are closely controlled by pre-existing porosity.

Of the three lead-zinc mines in the NWT, the deposits being exploited at Nanisivik meet fewest of the above-listed characteristic criteria for MVT deposits. The age of the host rocks and of the lead-zinc deposits at Nanisivik are Precambrian; the silver content of the ore is relatively high (about 60 g/t or 2 oz/ton); the geological environment is a rift zone; and the deposits in the hosting formation lie within several km of the mine site - efforts to find deposits further afield have not been successful. In addition, the Nanisivik deposits contain about two to three times as much iron sulfides (30% to 40%) as the average in deposits at Pine Point or Polaris (6% to 15%). It is also notable that whereas the formation hosting the Nanisivik deposits is dolomite, those hosting the Pine Point deposits and Polaris deposit are mainly limestones that have been dolomitized only locally. In view of the above, assigning the Nanisivik deposits to the MVT "pigeonhole" is questionable.

PINE POINT MINE

Pine Point Mines Ltd. Zinc,Lead
Pine Point, NWT 85B/15,16
XOE OWO N-42 deposit at:
60°50'50"N,114°27'12"W

REFERENCES

Anderson and Macqueen (1982); Beales and Jackson (1966, 1968); Billings and others (1969); Campbell (1967); Cumming and Robertson (1969); Gibbins (1983); Jackson and Beales (1967); Kyle (1980, 1981), Lajoie and Klein (1979); Macqueen (1975); Macqueen and Powell (1983); Medford and others (1983); Norris (1965); Paterson (1972); Rhodes (1981); Rhodes and others (1984); Roedder (1968); Seigel and others (1968); Skall (1975, 1976); Smith and others (1983); Williams (1981). The paper by Rhodes and others (Econ. Geol., v. 79, 1984) is the most recent and perhaps most definitive report on the geology and mineral deposits of the Pine Point area.

PROPERTY

4,476 leased claims as follows:

LEASE	LOT	GROUP	CLAIMS
2828- 2851			24
2878			994
2278	129	864	26
2280	130	864	32
2328	131	864	1
2329	575	814	816
2418	587	814	49
2419	601	814	30
2519	586	814	50
2553	646	814	68
2599	656	814	2
2600	657	814	5
2638	652	814	1
2639	588	814	124
2640	138	864	54
2641	139	864	22
2645	141	864	41
2646	142	864	19
2647	146	864	1
2648	147	864	1
2649	645	814	138
2650	600	814	8
2651	638	814	1
2652	649	814	8
2653	149	864	1
2654	150	864	3
2656	140	864	44
2657	594.1	814	97
2678	644	814	86
2679	653	814	72
2680	594.2	814	11
2681	151	864	2
2682	145	864	35
2683	659	814	77
2706	662	814	94
2790	665	814	15
2431	143	864	50
2432	640	814	111
2433	641	814	57
2330	137.3	864	27
2331	137.1	864	16
2279	137.2	864	115
2689	148	864	124
2776	639	814	6
2870	693	814	18
2871	694	814	12
2872	695	814	18
2892	698	814	754
2956	697	814	1
2957	696	814	115

LOCATION

The claims form a block 53 km long and several km wide on the south shore of Great Slave Lake, 120 km south of Yellowknife. A 97-km highway connects Pine

Point to Hay River and a 1,370 m gravel airstrip is situated near the mill. A spur line of the Great Slave Railway provides concentrate and freight transport.

HISTORY

Prospectors on their way to the Klondike goldfields were directed to sulfide outcrops near Pine Point by natives in 1898. Some claims were staked, but were allowed to lapse because only minor amounts of gold and silver were found. The area was examined again during the 1920's, and in 1929 Northern Lead Zinc Company, formed with financing from Ventures Ltd and Cominco, began a program that lasted two decades and included pitting and drilling. In 1948, a three-year concession of exclusive prospecting rights to 1295 square km was granted to these companies. Over 1000 claims were staked when the concession expired and a new company, Pine Point Mines Ltd, was formed to finance continuing work. Majority interest in Pine Point Mines Ltd is held by Cominco. Construction of a government-financed, 677-km-long railway from Roma (Alberta) to Pine Point began in 1962. During the next three years a townsite was laid out, services installed, the railway completed, a 4500 tpd concentrator constructed and considerable drilling and geophysical surveying (EM and IP) done. First ore from Pine Point was high-grade and was shipped in 1965, just prior to the completion of the mill. The concentrator capacity was increased from 4,500 to 9,000 tpd in 1968; currently 10,000 t of ore are treated daily.

Ore reserves, calculated in 1955 at 4.54 Mt grading 7% Zn and 4% Pb, have since been increased to 23.6 Mt grading 6.3% Zn and 2.7% Pb (Table 2-17). The greater reserves, despite annual production of several million tonnes, reflect successful exploration as well as acquisition of deposits from Pyramid Mining Co in 1966 (X-15 and W-17 deposits), Coronet Mines Ltd in 1972 (R-61 and S-65 deposits) and Conwest-Newconex Canadian Exploration in 1974 (A-55 deposit). The most recent exploration highlight was the 1981 discovery of the N-81 orebody (Fig. 2-19), which is the third-largest orebody found on the Pine Point property at 2.7 Mt grading 21% combined lead-zinc.

To date (1983), almost 51.5 Mt averaging 6.2% Zn and 2.5% Pb have been milled at Pine Point. All production, except for underground test mining of the M-40 deposit, has been from open pits.

DESCRIPTION

About 50 zinc-lead deposits (Fig. 2-19) have been found on the property within carbonates of the Pine Point Group (Table 2-16), a Middle Devonian (Givetian) barrier reef complex that separates deep-water carbonate and shale of the Mackenzie Basin to the north from back-reef evaporite deposits of the Elk Point Basin to the south (Kyle, 1980). The regional geological setting of the barrier complex is depicted in Figure 2-20 and a generalized subcrop map of the Pine Point property is shown in Figure 2-21.

Pine Point sulfide bodies range in size from less than 100 kt to as much as 14 Mt and occur in several stratigraphic positions in a 200-m section of the barrier complex (Fig. 2-22). Metal content of the ore ranges from about 3.0% to 14% zinc and from about 0.8% to 9.0% lead; the district average is about 5.8% zinc and 2.2% lead (Kyle, 1980). The main gangue components are iron (av. 3.5%) and carbonate.

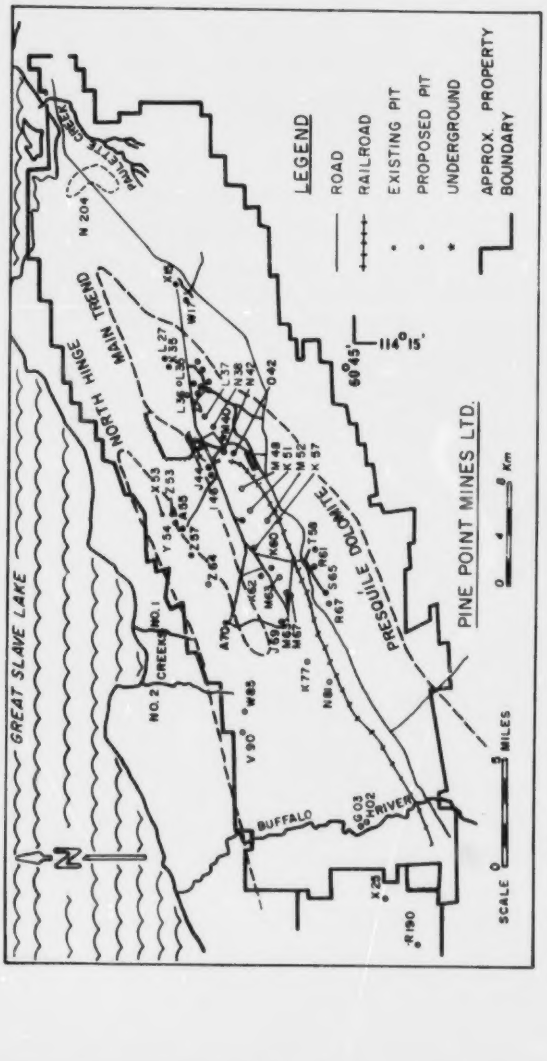
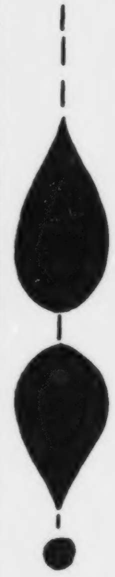


FIGURE 2-19: Deposits, Pine Point Property (from Gibbins, 1983)

TABLE 2-16: TABLE OF FORMATIONS, MIDDLE DEVONIAN, PINE POINT AREA (after Kyle, 1981; Norris, 1965; Rhodes, 1981; Skall, 1975)

FORMATION	DESCRIPTION	MINERALIZ'N
Slave Point	50-70m argillaceous limestone; minor dolostone, mudstone	
Watt Mtn.	15-45m limestone and dolostone, green mudstone interbeds	
	DISCONFORMITY	
Sulfur Point	reefal limestone, extensive coarse crystalline (Presqu'ilized) dolostone, transitional into Buffalo River Fm. to NW	
Buffalo River	calcareous shale	
Pine Point	fine crystalline reefal limestone and dolostone, transitional into Muskeg Fm. to SE	
Muskeg	evaporites	
Keg River	65-75m argillaceous dolostone and limestone	
CHINCHAGA	90-110m anhydrite and gypsum, minor carbonate	

PINE POINT GROUP, 75-150m



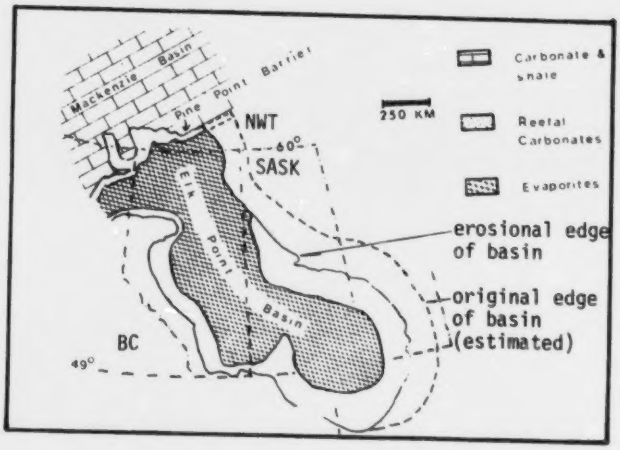


FIGURE 2-20: Middle Devonian stratigraphic relationships, Western Canada (after Kyle, 1981; Skall, 1975)

Skall (1975) subdivided the Pine Point Group and adjacent formations (Table 2-16) into a number of ecological facies and showed that subtle tectonic adjustments along three, N65°E-trending hinge zones were responsible for development of these facies. The North and Main hinges (Fig. 2-19) coincide respectively with the southern limit of marine Facies G and the northernmost extension of a depositional tongue of Facies J (Fig. 2-22). The South hinge coincides with the northernmost evaporites of the Muskeg Formation. Most of the Pine Point ore bodies are within the North and Main hinges (Fig. 2-19).

Karstification, a process that is considered important in preparing the host rock for MVT sulfide mineralization (Beales and Jackson, 1968), is particularly evident below the erosional disconformity at the top of Sulfur Point Formation (Table 2-16). Many of the Pine Point ore bodies (eg.M-40, O-42 and K-57 deposits of Fig. 2-22) are at or near the base of the Sulfur Point Formation in karsted carbonate that has been altered to coarse-crystalline dolostone (Presqu'ile or K Facies of Fig. 2-22).

Two principle types of ore bodies are present at Pine Point, tabular and prismatic (Rhodes, 1981). Tabular deposits are elongate, flat-lying ore bodies associated with an interconnected network of karst channels mainly confined to the base of the Sulfur Point Formation along the North and Main hinges (eg. M-40 deposit of Fig. 2-22). Many of the karst channels are small, but they can attain thicknesses of up to 12 m and widths of up to 240 m, thus constituting ore deposits when mineralized.

Until recently, most Pine Point production has been from prismatic deposits; vertically elongate ore bodies that formed when further dissolution in tabular karst zones caused sagging, foundering and collapse of the overlying strata. Collapse can affect about 100 m of stratigraphy, causing thick accumulations of internal sediment at and above the tabular karst zone (Rhodes, 1981). Prismatic ore bodies (eg. K-57 and O-42 deposits of Fig. 2-22) typically contain about 1 Mt of ore.

Some Pine Point ore bodies are well below the base of the Sulfur Point Formation (eg.X-15 and W-17 deposits of Fig. 2-22) and are thought to have formed because continuing dissolution below tabular or prismatic orebodies allowed them to collapse into underlying strata (Rhodes, 1981). One of the largest deposits on the Pine Point property is N-81 (Fig. 2-19), a collapsed prismatic orebody that was discovered in 1981 when an area covered by frequency-domain IP in 1969 was resurveyed. It contains 2.7 Mt of ore grading 14% Zn and 7% Pb. The N-81 orebody is deep by Pine Point standards, being covered by about 20 m of overburden and 20 m of caprock, and a complex pit design will be needed to exploit the ore.

The origin of the ore deposits at Pine Point is a subject of debate. Campbell (1967) suggested that mineralization was from thermal waters arising along the MacDonald-Hay River fault systems that underlie the Pine Point ore trend. Skall (1975) documents facies changes that he ascribes to reactivation of these basement faults during the Givetian Stage of the Devonian and points out that the statistical mean elongation of individual ore bodies parallels the fault-controlled trend of the Main and North hinges. However, Kyle (1980) remarks that the N65°E trends of the hinge zones do not parallel the N45°E trace of basement faults as determined from aeromagnetic data.

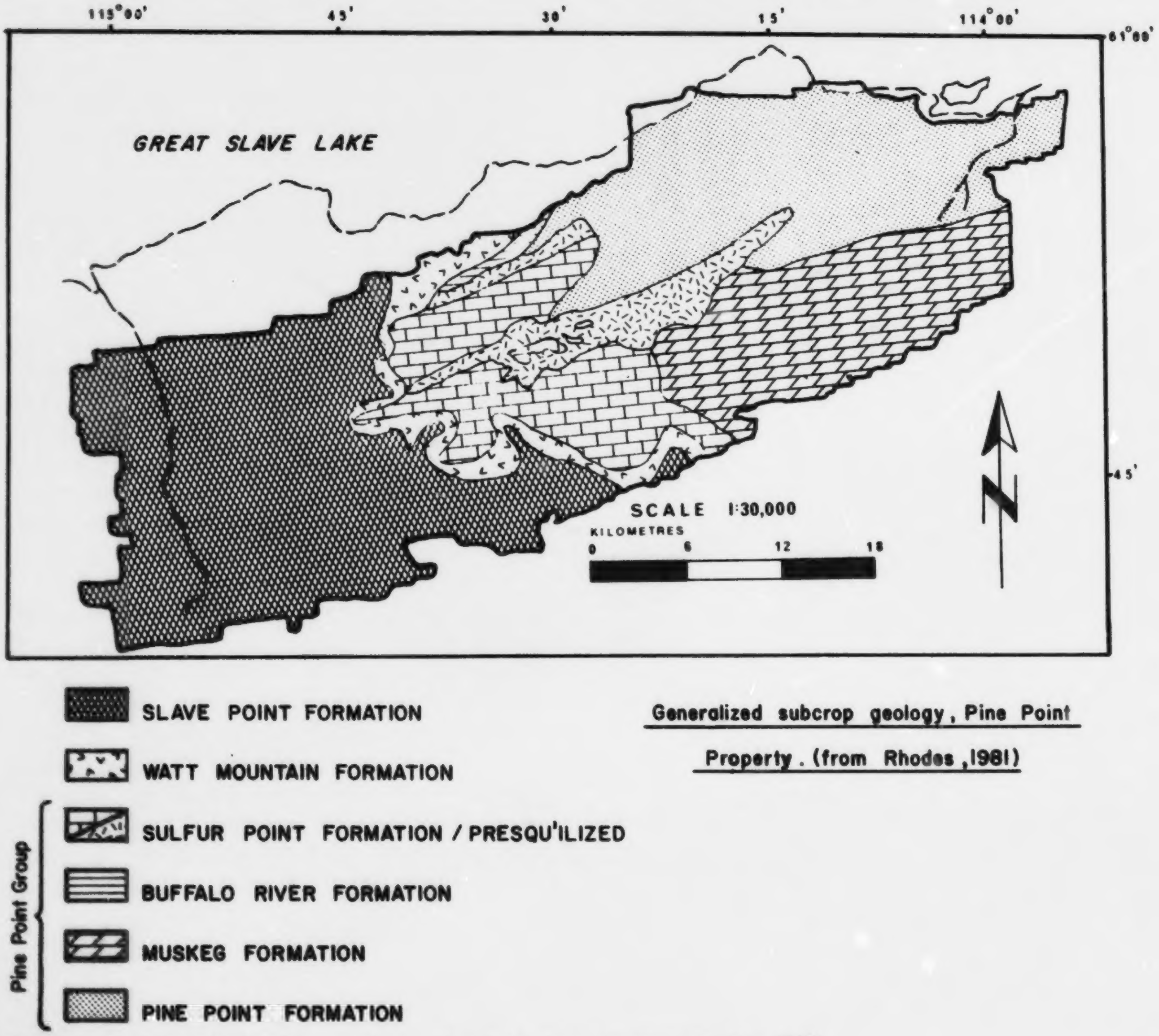

115°00'
45'
30'
15'
114°00'
61°00'
45'
GREAT SLAVE LAKE
SCALE 1:30,000
KILOMETRES
0
6
12
18
SLAVE POINT FORMATION
WATT MOUNTAIN FORMATION
SULFUR POINT FORMATION / PRESQU'ILIZED
BUFFALO RIVER FORMATION
MUSKEG FORMATION
PINE POINT FORMATION
Pine Point Group
Generalized subcrop geology, Pine Point Property. (from Rhodes, 1981)

FIGURE 2-21: Generalized subcrop geology, Pine Point Property (from Rhodes, 1981)

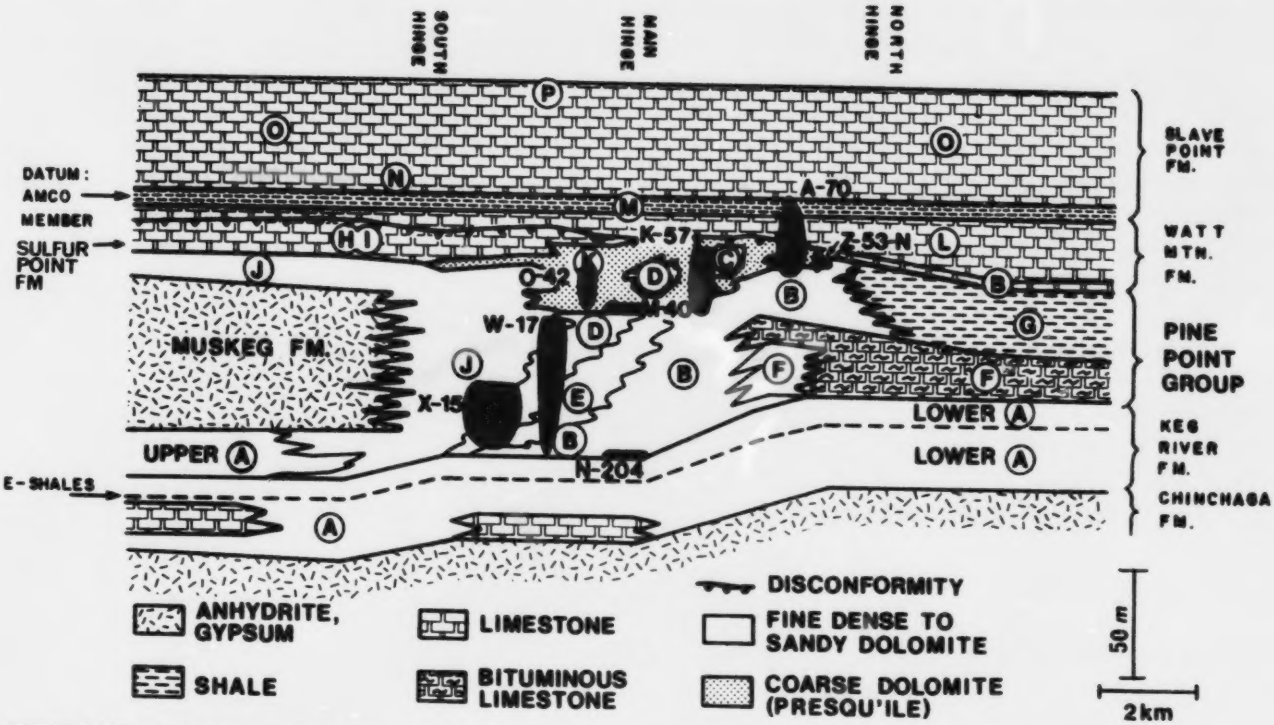

SOUTH MINE
MAIN MINE
NORTH MINE
DATUM: AMCO MEMBER
SULFUR POINT FM
E-SHALES
SLAVE POINT FM.
WATT MTN. FM.
PINE POINT GROUP
KEG RIVER FM.
CHINCHAGA FM.
MUSKEG FM.
UPPER Ⓐ
LOWER Ⓐ
LOWER Ⓐ
A-70
K-57
Z-53-N
O-42
M-40
W-17
X-15
N-204
Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ Ⓗ Ⓘ Ⓙ Ⓚ Ⓛ Ⓜ Ⓝ Ⓞ Ⓟ
ANHYDRITE, GYPSUM
SHALE
LIMESTONE
BITUMINOUS LIMESTONE
DISCONFORMITY
FINE DENSE TO SANDY DOLOMITE
COARSE DOLOMITE (PRESQU'ILE)
50 m
2km

FIGURE 2-22: Schematic west-facing, southeast-northwest section across the Presqu'ile barrier complex on the Pine Point Property, showing facies A through P and approximate locations of the major ore bodies as projected into a single cross section. Highly generalized and modified from Kyle (1980); original facies designations and environmental interpretations from Skall(1975). A- Keg River Formation; dolomite, variably argillaceous (marine platform). B through K- Pine Point Group. B- argillaceous dolomite (off-reef facies); C- micritic limestone (shallow fore-reef facies); D- sucrosic Dolomite, skeletal limestone (organic barrier facies); E- sucrosic dolomite (clean arenite facies); F- micritic, bituminous limestone (deep marine basinal facies); G- calcareous shale (Buffalo River Facies); H and I- micritic limestone (gastropod and Amphipora facies); J- sucrosic dolomite (back-reef facies); K- coarsely crystalline dolomite (Presqu'ile facies); L- Watt Mountain Formation, micritic limestone (green shaly facies); M through P- Slave Point Formation; M- micritic limestone and shale (Amco Member); N- micritic limestone (tidal flat member); O- intraclastic limestone (shallow platform member); P- micritic limestone (deep platform member); (from Macqueen and Powell, 1983).

Jackson and Beales (1967) regard a genetic relation of the ore bodies to basement faults as unwarranted. They postulated that mineralization was a result of normal evolution in a sedimentary basin. Metals were released by weathering of continental rocks and were deposited with basinal shales as absorbed metal ions on clay minerals. Metals were released as soluble metal chloride and organic complexes during compaction and diagenesis. Metal-bearing brines migrated laterally into the permeable reef complex, travelling in the direction of lower hydraulic head. Reduction of sulphate, presumed to be derived from evaporitic strata in the Elk Point Basin to the south of the Pine Point Barrier Reef, resulted in concentration of hydrogen sulphide in more permeable zones of the carbonate complex. Mixing

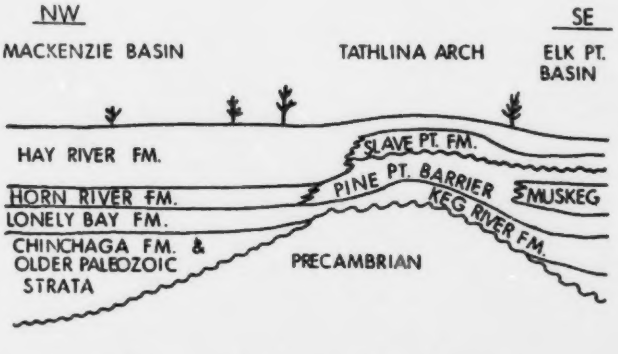

NW
SE
MACKENZIE BASIN
TATHLINA ARCH
ELK PT. BASIN
HAY RIVER FM.
SLAVE PT. FM.
HORN RIVER FM.
PINE PT. BARRIER
MUSKEG
LONELY BAY FM.
KEG RIVER FM.
CHINCHAGA FM. & OLDER PALEOZOIC STRATA
PRECAMBRIAN

FIGURE 2-2 : Generalized and partly schematic geological cross section of Devonian and older strata across the southern margin of the Mackenzie Basin (from Smith and others, 1983)

of metal-bearing brines with reduced sulfur resulted in precipitation of metal sulfides.

The Beales and Jackson hypothesis is supported in more recent studies by Macqueen and others (1975), Smith and others (1983), and Medford and others (1983). The results of these studies can be summarized as follows:

1) Macqueen and others (1983) reported anomalous lead-zinc content in Horn River Formation shales of the Mackenzie Basin (Fig. 2-23), a facies equivalent of part of the Pine Point Formation and thus a source for metalliferous brines.
2) Medford and others (1983) measured $^{87}Sr/^{86}Sr$ ratios of sulfides, carbonates and fluid inclusions from Pine Point to determine if ore-forming fluids introduced strontium from a reservoir other than the Devonian seawater in which the ore carbonates were formed. They reported the presence of gangue minerals having $^{87}Sr/^{86}Sr$ ratios above the range for Devonian marine carbonates, and suggested that this might indicate the former presence of fertile, metal-bearing ore fluids derived from sedimentary rocks of higher Rb/Sr ratio.
3) Smith and others (1983) used electric and sonic logs for 29 oil wells distributed unevenly over a 40,000 km^2 portion of the Mackenzie Basin to construct bulk porosity plots and evaluate the shale compaction history of the Devonian strata. They found that considerable downward dewatering was indicated for the lowest zones (35 m to 100 m) of many of the shale sequences. They calculated that the fluids generated by dewatering could carry at least 20 Mt of metal (Pb+Zn). Their geophysical evidence suggested that migration was not a broad front of movement, but rather a channelled flow through only the most permeable zones in the underlying strata, in this case the carbonate strata of the Lonely Bay Formation, which is underlain by relatively impermeable evaporites of the Chinchaga Formation (Fig. 2-23). The authors recognized a pattern of shale compaction that appears to focus and direct the flow of expelled fluids towards the Pine Point Barrier Reef Complex.

This mounting evidence to support at least a modified version of the Beales and Jackson hypothesis does not discount the role of the basement faults. Reactivation of these faults was probably responsible for initiating the Pine Point Barrier Complex and setting the geological scenario for mineralization. Timing is a problem that remains to be resolved. Kyle (1980) believes that the concept of multiple phases of metal enrichment warrants consideration.

CURRENT WORK AND RESULTS

Development at Pine Point during 1982 and 1983 is summarized in Table 2-18 and an eight-year production and reserves summary from 1976 to 1983 is shown in Table 2-17.

TABLE 2-17: PRODUCTION AND RESERVES, PINE POINT 1976 TO 1983

	PRODUCTION			RESERVES		
Year	milled	kt Zn	Kt Pb	Mt	Grade (Zn,	Pb)
1976	3.42Mt	170	54	32.7	5.4%	2.0%
1977	3.12Mt	156	61	33.6	5.3%	2.1%
1978	2.98Mt	162	74	33.6	5.1%	1.9%
1979	2.99Mt	151	54	34.5	5.0%	1.9%
1980	3.29Mt	171	62	37.2	5.3%	1.9%
1981	3.30Mt	148	64	37.2	5.4%	1.9%
1982	2.22Mt	153	64	31.7	6.1%	2.4%
1983	0.89Mt	68	23	23.6	6.3%	2.7%

TABLE 2-18: DEVELOPMENT, PINE POINT MINES, 1980 TO 1983

Development	1980	1981	1982	1983
Waste Removal (Mt)	14.9	19.7	25.9	12.7
Haulage Roads (km)	14.5	18.0	*N.R.	*N.R.
Expl'n drill (m)	27,432	39,300	43,282	35,052
Definition drill (m)	41,000	47,850	67,970	16,154
Geophysics (line-km-IP)	278	381	431	97
Expl'n Exp'd ($\$X10^6$)	1.9	2.8	3.7	2.4

* N.R. - not reported.

The operating loss incurred by Pine Point Mines in 1982 and 1983 was the first since production began in 1965. Inflation, wage increases and the higher cost of stripping waste were responsible for escalating costs at a time when low prices for lead and zinc resulted in reduced profitability. Measures were taken in 1982 to improve operating performance by reducing production from lower-grade ore sources, placing the concentrator on a five-day week, curtailing operating and capital expenditures, freezing the salaries of non-union staff and placing a freeze on hiring. Nevertheless, mining continued to be unprofitable and operations were shut down on January 2, 1983. The mine reopened on June 15, 1983, after unionized employees agreed to a 10% pay cut and after financial assistance was given by the federal and territorial governments. In addition, concessions were negotiated for reduced freight rates, smelter charges and power tariffs. Lead and zinc prices improved in the latter part of 1983, and by early 1984 most of the assistance and concessions were discontinued as the mine headed towards profitability.

1982

Mine production was from eleven pits; the high number of production pits reflecting exploitation of smaller, tabular orebodies along the north hinge (Fig. 2-19). Five pits were mined out and three others were being prepared for production at year-end. The tabular X-53 deposit (Fig. 2-19) was the main producer, contributing almost 40% of the annual mill feed.

Further development at the N-81 deposit (Fig. 2-19), which was discovered in 1981, confirmed reserves of 2.7 Mt of ore grading 14% Zn and 7% Pb. Preparation of this deposit for production in 1984 included construction of a haul road and a 3.2-km power transmission line to the pit. A dry facility was completed and a drainage ditch was started. N-81 is the third largest deposit found in the Pine Point camp.

Rising mining costs and higher strip ratios required the removal of some presently uneconomical material from the ore reserves, but 1982 reserves are comparable to 1981 reserves because of new ore outlined in N-81 (Table 2-17).

1983

Mine production came from five operating and two development pits. The X-54 and X-53 deposits were mined out, the latter having provided 50% of concentrate production during the year. The other major contributor was the A-55 deposit, which provided 30% of concentrate production.

Development continued on two tabular orebodies and on the prismatic N-81 deposit. About 45% of the required overburden stripping at N-81 was completed. More than 2400 m of deep-well drilling was completed to enable large-scale pumping to commence at the N-81 orebody and to dewater the lower benches in the A-55 pit.

Table 2-17 shows significantly lower ore reserves at year-end. This is due to the removal from the ore reserve of 8.3 Mt grading 5.5% Zn and 1.4% Pb; this material being mainly underground reserves that are now deemed uneconomical because of rising mining costs. Exploration in 1983 outlined new reserves of 708 kt grading 4.2% Zn and 1.1% Pb in two areas on the property.

NANISIVIK MINE

Nanisivik Mines Ltd.
#401, 44 Victoria St.
Toronto, Ont., M5C 1Y2

Zinc, Lead, Silver
48 C/1
Orebody at:
73°02'30"N,84°28'30"W

REFERENCES

Blackadar (1956, 1965, 1970); Christie and others (1972); Clayton and Thorpe (1982); Ford (1982); Fish (1979); Geldsetzer (1973a, 1973b); Gibbins (1982); Graf (1974); Iannelli (1979); Jackson and Iannelli (1981); Jackson and others (1975, 1978, 1980); Lemon and Blackadar (1963); Olson (1977, 1984); Yates (1975).

PROPERTY

A claim, FISH 1-12, HB claim, 22 LION claims, LYNK 1-4 (Mining Leases 2274-2275, 2451-2453 and 2799-2804 covering about 54 sq. km).

LOCATION

The Nanisivik mine is south of Strathcona Sound on Borden Peninsula, northwestern Baffin Island. It is 27 km east of the community of Arctic Bay and is serviced twice a week by commercial jet flights from Montreal, 2000 km to the south. A marine wharf, just north of the mill on Strathcona Sound, accommodates ocean-going ships that carry concentrates to smelters during the short shipping season.

HISTORY

Galena, sphalerite and other sulfides were originally found at Strathcona Sound by A. English, a prospector who accompanied a Dominion Government Expedition to the Arctic Islands in 1910. Four claims were staked in the area by prospectors J. Tibbit and F. McInnes in 1937, but assessment work was not done and the claims lapsed. A report on the geology of the Strathcona Sound area by R.G. Blackadar (1956) included a description of an extensive pyrite zone containing minor galena and sphalerite. This report prompted geologists from Texas Gulf Sulfur Co Ltd (TGS) to investigate the area, and in 1957 fifteen claims were staked to partly cover what proved to be the eastern end of the main orebody (Main Lens). Work done by TGS between 1958 and 1969 included 30,500 m of diamond drilling, bulk sampling from an adit driven into the east end of the orebody, geophysical surveying and additional claim staking. In 1972 an option on the Strathcona Sound property was negotiated with Mineral Resources International. Watts, Griffis and McOuat Ltd, commissioned to do a feasibility study, recommended that the property be brought to production. Financing was arranged through agreements with TGS (now Kidd Creek Mines), Metallgesellschaft AG, Billiton BV and various banks. A development agreement was negotiated whereby the Government of Canada would obtain an 18% interest in the project for supplying infrastructure. In 1974 Strathcona Mineral Services was contracted to manage the project and Nanisivik Mines Ltd was formed to operate the mine. Two adits and a connecting ramp were driven into the west end of the orebody and a concentrator, central power plant and underground crushing plant were completed in September, 1976, when production began at a rate of 1,420 tpd. Preproduction costs, excluding property acquisition and exploration, amounted to about $51 million.

In recent years exploration has focused on three principal targets: The Lower Lens sulfide zone, which is several decameters beneath the Main Lens; the North Zone, immediately north and below the Main Lens; and Area 14, five km to the southeast. By 1981, potential reserves in the Lower Zone were deemed sufficient to warrant underground development, and a ramp was laid out to provide access to it and to the nearby North Zone. In Area 14, drilling outlined a 1/2-km-long, 10-m to 20-m-thick sulfide deposit containing ore-grade material along a 250-m strike segment. About 125 kt of ore has also been outlined in the Shale Hill Area, several hundred meters north of the Main Lens. Several massive sulfide deposits consisting mainly of pyrite have also been evaluated in the mine area by drilling and by a variety of geophysical surveys including reflection EM (radar), VLF-EM, Turam, pulse EM and magnetometer.

Nanisivik Mines Ltd is now owned: 53% by Mineral Resources International, 18% by Government of Canada, 11.25% by Billiton BV, and 6.25% by Kidd Creek Mines Ltd.

DESCRIPTION

Nanisivik is within the Arctic Platform on Borden Peninsula, northwestern Baffin Island. Most of Baffin Island is underlain by Aphebian-Archean crystalline gneiss of the Churchill Province, but on Borden Peninsula a depression in this basement, Borden Basin (Christie and others, 1972), is mainly filled by Neohelikian sedimentary rocks of the Bylot Supergroup (Jackson and Iannelli, 1981). The basic formational nomenclature of the Bylot Supergroup (Table 2-19), which is subdivided in ascending order into the Eqalulik, Uluksan and Nunatsiaq Groups, was established by Lemon and Blackadar (1963) and Blackadar (1970). The Bylot Supergroup is cut by Franklin diabase dikes and is overlain unconformably by Paleozoic to Eocene strata (Fig. 2-24).

TABLE 2-19: TABLE OF FORMATIONS, BORDEN BASIN (from Jackson and Iannelli, 1981)

HADRYNIAN	Franklin Intrusions: Diabase			
		GP	Intrusive Contact	
NEOHELIKIAN	BYLOT SUPERGROUP	NUNATSIAQ	Elwin Fm. (470-1220 m):	EL_1: Quartzarenite, siltstone EL_2: Sandstone, siltstone, dolostone
			Gradational	
			Strathcona Sound Fm: (430-910 m+)	SS_6: SS_{1-5} lithologies interbedded SS_5: Polymictic conglomerate SS_4: Siltstone, greywacke SS_3: Arkose-greywacke, shale SS_2: Dolostone, dolostone conglomerate SS_1: Shale, siltstone
			Gradational	
			Athole Point Fm: (0-585 m) Limestone, sandstone, shale	
		Gradational		Gradational to Unconformable
		ULUKSAN	Victor Bay Fm: (156-735 m)	VB_2: Limestone, dolostone, flat pebble conglomerate VB_1: Shale, siltstone, sandstone, limestone
			Conformable, Abrupt to Gradational	
			Society Cliffs Fm: (263-856 m)	SC_2: Stromatolitic & massive dolostones
		Chiefly Unconformable?		SC_1: Stromatolitic dolostone, shale, sandstone, gypsum
		EQALULIK	Fabricius Fiord Fm: (400-2000 m+) FF_4: Arkose, conglomerate, dolostone FF_3: Subarkose, conglomerate FF_2: Shale, quartzarenite FF_1: Quartzarenite, shale	Gradational to Unconformable Arctic Bay Fm: (180-770 m) AB_4: Shale, dolostone AB_3: Shale, siltstone AB_2: Shale, quartzarenite AB_1: Siltstone, quartzarenite
			Conformable, Abrupt to Gradational	
			Adams Sound Fm: (0-616 m) AS_3: Quartzarenite, conglomerate, shale AS_2: Quartzarenite AS_1: Quartzarenite, conglomerate	AS_U: Quartzarenite AS_L: Quartzarenite, conglomerate
			Conformable	
			Nauyat Fm: (0-430 m)	NA_2: Plateau basalt NA_1: Quartzarenite, subarkose, basalt
Nonconformity				
ARCHEAN-APHEBIAN	Granitic gneiss basement complex: Migmatite, foliated granitic rocks, granite, charnockite, supracrustal relics			

Borden Basin evolved within the North Baffin Rift Zone (Jackson and others, 1975) and probably developed along a failed arm or aulacogen during Neohelikian (1.2 Ga) ocean opening to the northwest (Olson, 1977). Faulting took place throughout deposition of the Bylot Supergroup; episodic vertical movements along steep, west-to northwest-trending faults gave rise to horsts and grabens. Less widespread and relatively local northerly trending faulting also occurred (Jackson and Iannelli, 1981).

The Nanisivik area is on a major, west-northwest-trending graben, the long axis of which underlies and parallels Strathcona Sound (Clayton and Thorpe, 1982). The Nanisivik ore deposits are in an area where subsidiary horsts and grabens have been superposed on this major structure; the Main Lens is exposed on a hill that coincides with one of these subsidiary horsts (Fig. 2-25b).

The geology at surface is relatively simple. Dolomite of the Society Cliffs Formation, the lowermost formation of the Uluksan Group, underlies most of the area between Strathcona Sound and the South Boundary Fault (Fig. 2-25a). Locally the dolomite is overlain by shales of the Victor Bay Formation (Table 2-19) and cut by Franklin diabase dykes (Clayton and Thorpe, 1982). One of these dykes cuts across the orebody (Fig. 2-25b), which proves that mineralization is pre-Hadrynian. The deposit is in the upper part of the Society Cliffs Formation, which consists of slightly metamorphosed, algal-laminated, brown-weathering, light-grey to black dolostone that commonly emits a petroliferous odour when broken and contains sparsely-disseminated blebs of bituminous material (Jackson and Iannelli, 1981). Most of the formation has undergone recrystallization and has been extensively brecciated; mosaic, crackle and rubble breccia are common. The cause of the brecciation is not clear, but it probably results from collapse (Clayton and Thorpe, 1982). Breccias near the upper contact of the Society Cliffs Formation do not contain Victor Bay material, implying that collapse took place before deposition of Victor Bay Formation sediments. Geldsetzer (1973b) cites this as evidence of a hiatus between deposition of the Society Cliffs and Victor Bay Formations. The strata in the mine area, where relatively undisturbed by faulting, strike easterly

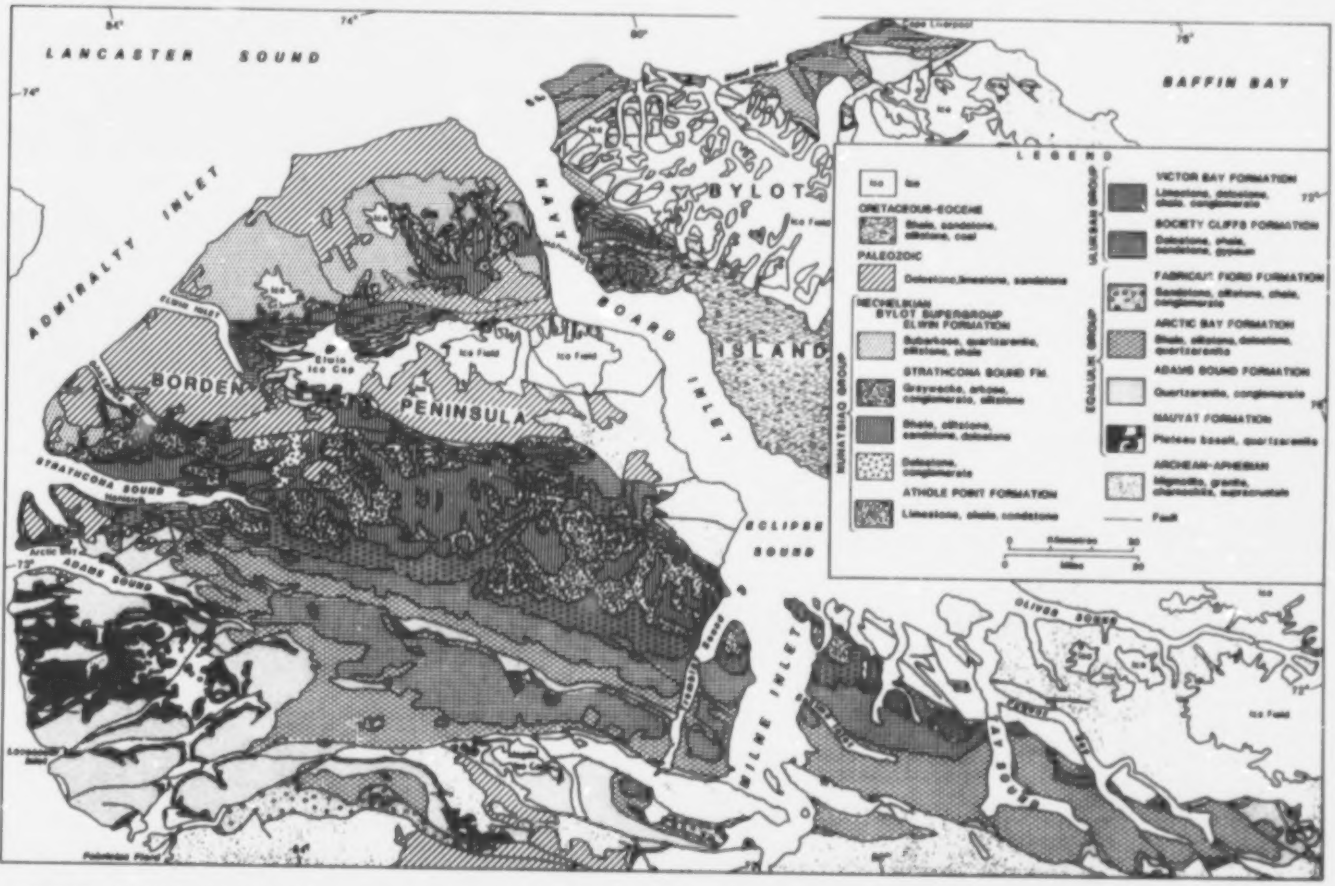
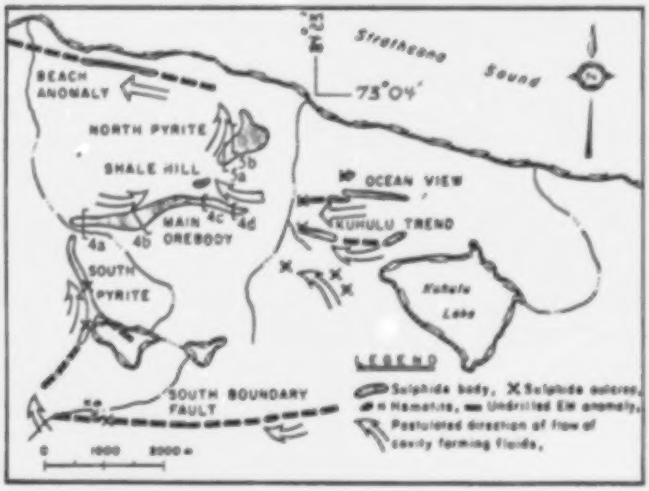

LANCASTER SOUND
BAFFIN BAY
ADMIRALTY INLET
NAVY BOARD INLET
BYLOT ISLAND
BORDEN PENINSULA
STRATHCONA SOUND
ECLIPSE SOUND
MILNE INLET
ADAMS SOUND
OLIVER SOUND
Elwin Inlet
Elwin Ice Cap
Ice Field
Arctic Bay
LEGEND
Ice
CRETACEOUS-EOCENE
PALEOZOIC
BYLOT SUPERGROUP
ELWIN FORMATION
STRATHCONA SOUND FM.
ATHOLE POINT FORMATION
VICTOR BAY FORMATION
SOCIETY CLIFFS FORMATION
FABRICIUS FIORD FORMATION
ARCTIC BAY FORMATION
ADAMS SOUND FORMATION
NAUYAT FORMATION
ARCHEAN-APHEBIAN
ULUKSAN GROUP
EQALULIK GROUP
NUNATSIAQ GROUP
Fault
Kilometres
Miles
74°
73°
72°
84°
80°
76°

FIGURE 2-24: Regional geology, Borden Basin. Nanisivik is shown south of Strathcona Sound at about 73°N latitude and 85°W longtitude (from Jackson and Iannelli, 1981)

and dip gently to the north.

Nanisivik's main orebody, the Main Lens, is one of many massive sulfide deposits that have been found within a 5-km radius of the mill site (Fig. 2-25a), but few others contain economic concentrations of lead and zinc. The massive sulfide bodies, which are mainly pyrite, occupy cavities that resemble water-table caves in the Society Cliffs dolostone (Clayton and Thorpe, 1982), but the recent discovery of a 10-Mt pyrite deposit in the hangingwall of the South Boundary Fault (Fig. 2-25) indicates that massive sulfides are also fault related.

The Main Lens is a tabular, horizontal orebody outcropping on the slopes of a prominent hill that forms the topographic expression of the horst that hosts the deposit. In plan, the 2-m to 30-m thick Main Lens is about 100 m wide and about 3 km long (Fig. 2-25a). The southern part of the Main Lens is cut by a fault that displaces strata by about 120 m, but only displaces the orebody by a meter or two (Fig. 2-26).


Strathcona
Sound
73°04'
BEACH ANOMALY
NORTH PYRITE
SHALE HILL
5b
5a
4c
4d
MAIN OREBODY
4a
4b
SOUTH PYRITE
OCEAN VIEW
KUHULU TREND
Kuhulu Lake
SOUTH BOUNDARY FAULT
LEGEND
Sulphide body, X Sulphide outcrop,
Hematite, Undrilled EM anomaly,
Postulated direction of flow of cavity forming fluids,
0
1000
2000 m

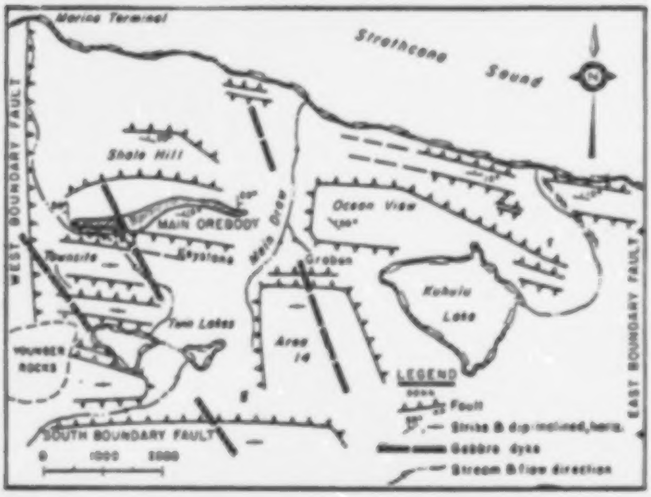

Marine Terminal
Strathcona
Sound
WEST BOUNDARY FAULT
Shale Hill
MAIN OREBODY
Townsite
Keystone
Main Draw
Ocean View
Graben
Kuhulu Lake
Twin Lakes
YOUNGER ROCKS
Area 14
EAST BOUNDARY FAULT
SOUTH BOUNDARY FAULT
LEGEND
Fault
Strike & dip inclined, horiz.
Gabbro dyke
Stream & flow direction
0
1000
2000

FIGURE 2-25a (above): Sulphide bodies, Nanisivik
2-25b (below): Block faulting, Nanisivik
(from Clayton and Thorpe, 1982)

The Lower Lens is about 20 m below the Main Lens and is probably connected to it by a narrow, subvertical keel sulfide zone(s) (Fig. 2-26). The Lower Lens is neither as continuous as the Main Lens nor as well mineralized. Recently, drilling has confirmed the presence of a third lens at slightly lower elevation than the Lower Lens. It now appears that there are many pods, lenses and stringers of sulfides at various stratigraphic levels below the Main Lens. These include the North Zone, which is immediately north and just below the western part of the Main Lens, and the Shale Hill Zone, which is several hundred meters north of the Main Lens. In 1981, drilling indicated geological reserves of 100 kt grading 16% Zn and 3% Pb in Area 14 (Fig. 2-25b), the only significant ore-bearing massive sulfide deposit found on the property that is not adjacent to the Main Lens.

The following description of Nanisivik ore is from Gibbins (1983).

> Typical ore consists of euhedral to subhedral grains of sphalerite and galena with anhedral pyrite, sparry dolomite and ice as gangue. Sulphide ore is normally well bedded, commonly with cut and fill and onlap features. Massive pyrite and very-coarse-grained sulfide breccias are locally developed. Both pyrite and sphalerite stalactites are present, but very rare. Long, horizontal fins of host rock dolomite and related corrosion features are common in the mine workings of the Main Lens. Ford (1982) estimated

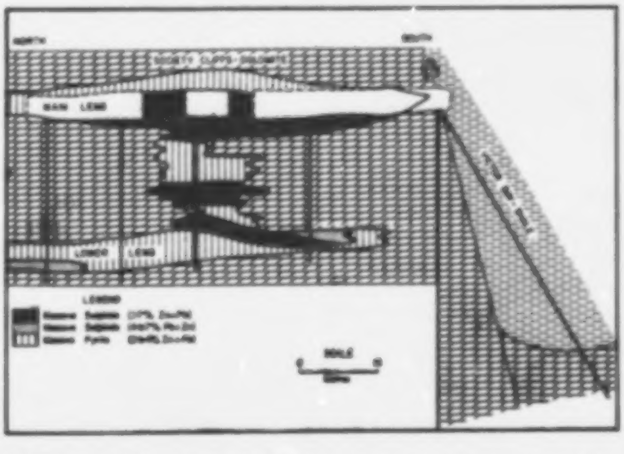

NORTH
SOUTH
SOCIETY CLIFFS DOLOMITE
MAIN LENS
LOWER LENS
LEGEND
SCALE

FIGURE 2-26: Generalised cross section of the Nanisivik deposit (from Gibbins, 1982)

at least 95% of the volume of the main ore cavity was created by ore fluids dissolving dolomite as sulfides were emplaced .

The sulfide bodies at Nanisivik pass through some major faults with little or no change in elevation, implying that their emplacement was not stratigraphically controlled. Nor does the emplacement of sulfide bodies appear to be related to brecciation; there are many places where sulfides end in brecciated algal dolomite. The distribution of sulfides strongly suggests a system in which the drainage was along the faults until "meeting a sinkhole resulted in a breakthrough northwards towards the Sound and deposition of sulfides in the cavities" (Clayton and Thorpe, 1982).

Olson (1977), in presenting fluid inclusion data from sphalerite at Nanisivik, gave 100°C as the average temperature from six inclusions. Temperatures from inclusions in sparry dolomite and sulfur isotope fractionation studies are generally higher, the highest average being about 200°C. Clayton and Thorpe (1982) consider this as evidence of two separate processes; the cavities being formed as horizontal caves by meteoric waters at low temperature and pressure, and the minerals being deposited at elevated temperature and pressure, ie., at greater depth and under Victor Bay cover. They suggest that mineralized fluids evolved from connate water from the Arctic Bay or Adams Sound Formations; they further suggest that the cavities could have remained open for a short time under Victor Bay cover and that the meteoric and connate waters were contemporaneous, or nearly so.

CURRENT WORK AND RESULTS

Production and reserves at Nanisivik from 1977 to 1983 are listed in Table 2-20, and a summary of mine development during 1982 and 1983 is given in Table 2-21. Most of the underground development was done to test the Lower Lens. A decline was driven through the North Zone to a segment of the Lower Lens beneath the center of the Main Lens. Drilling of this zone, the North 17 Zone, indicated geological reserves of 1.0 Mt of ore grading 13% Zn (Pb is rarely found in the Lower Lens). A ramp was also driven to a segment of the Lower Lens beneath the eastern part of the Main Lens, where drilling indicated potential for 0.5 Mt of ore. Some ore was mined from the Lower Lens during 1983.

TABLE 2-20: PRODUCTION AND RESERVES, NANISIVIK MINE 1977 TO 1983

	PRODUCTION			RESERVES		
YEAR	kt milled	kt Zn	Kt Pb	kt	% Zn	% Pb
1977	525	68	10.8	6350	13.2	1.4
1978	575	73	7.2	5300	11.6	1.3
1979	615	76	7.6	3250	11.9	1.2
1980	435	64	10.3	3250	12.0	1.1
1981	624	68	8.3	3580	10.3	0.8
1982	622	75	9.4	4400	11.0	1.5
1983	628	61	6.4	3800	10.1	0.8

TABLE 2-21: DEVELOPMENT, NANISIVIK, 1982 TO 1983

YEAR	Lateral Dev.	Raising	Surface Drilling	Underground Drilling
1982	1721 m		688 m	5007 m
1983	977 m	56 m	440 m	6862 m

SOURCE: Mining Inspection Service, Gov't of the NWT, does not include drilling at Area 14.

Exploration in Area 14, five km southeast of the mill, established probable reserves of 350,000 t of ore grading 15% combined lead and zinc. The improved ore-reserve situation in 1982 (Table 2-20) reflects the tonnage added from Area 14 as well as additional reserves moved from the possible to the probable category in the Main Lens and the Lower Lens. Mining of Area 14 is planned in 1984.

POLARIS MINE

Cominco Ltd.	Zinc, Lead
Northern Group,	68 H/8
Precambrian Building,	Deposit at:
Yellowknife, NWT	75°23'42"N,96°56'00"W

REFERENCES

Gibbins (1982, 1983); Jowett (1975); Kerr (1977a, 1977b); Kerr and Christie (1965); Muraro (1973), Scales (1982); Thorsteinsson (1958, 1973); Thorsteinsson and Kerr (1968).

PROPERTY

POLARIS 1-21 claims (Mining Lease 2346 covering 396 ha). Cominco also controls other mining leases that cover most of Little Cornwallis Island and all of Truro Island to the southwest (Fig. 2-28).

LOCATION

The Polaris Mine is at the southwest extremity of Little Cornwallis Island, 1700 km north-northeast of Yellowknife and 100 km north-northeast of Resolute on Cornwallis Island. Supplies and personnel are flown to an airstrip at the mine site from Resolute, which is regularly serviced by commercial flights from Montreal/Frobisher Bay (Nordair) and Edmonton/ Yellowknife (Pacific Western Airlines). Borek Air and Bradley Air Services operate Twin Otters from a base in Resolute. A wharf on Crozier Strait at the mine site accommodates ocean-going ships that carry non-perishable supplies to the mine and concentrates to smelters.

HISTORY

Geological Survey of Canada field parties headed by Thorsteinsson and Fortier in 1950 and by Thorsteinsson during the succeeding three years were the first to undertake a systematic geological reconnaissance of the Cornwallis Islands (Thorsteinsson, 1958). More detailed stratigraphic and mapping studies were carried out by Thorsteinsson and Kerr (1968), and a 1:125,000-scale geological map of the McDougall Sound area (NTS 68H) was produced by Thorsteinsson (1973, G.S.C. Open File 139). Regional studies of the Cornwallis Fold Belt were done by Kerr and Christie (1965) and Kerr (1977a). Brief descriptions of the Polaris deposit and other deposits of the Cornwallis Lead-Zinc District were given by Kerr (1977b) and Gibbins (1982, 1983). Ore-forming fluids at Polaris were the subject of a fluid-inclusion study by Jowett (1975).

Geologists mapping oil permits for Bakenko Mines Ltd discovered galena and sphalerite on Little Cornwallis Island in 1960. Between 1961 and 1963, Bakenko drilled and staked ground covering the Polaris deposit and the Eclipse showings (Fig.2-28). The claims were optioned to Cominco in 1964, and geological mapping, surface diamond drilling and geochemical surveying were carried out between 1964 and 1966. A geophysical survey in 1970 detected a coincident gravity and IP anomaly. The anomaly was drilled in 1971, and 16 Mt of ore grading 20% combined lead-zinc was outlined. A new company, Arvik Mines Ltd, was formed to develop the Little Cornwallis properties. Encouraging results from further drilling in 1972 led to underground development in 1972-73 to obtain a bulk sample and to confirm continuity of the orebody and viability of mining in permafrost. Extensive underground drilling established reserves estimated at 23.0 Mt grading 14.1% zinc and 4.3% lead. After feasibility studies in 1979, Cominco and Bakenko decided to dissolve Arvik Mines and bring the Polaris deposit to production. The orebody was turned over to Cominco under an agreement in which Bakenko Mines retained an option on a royalty interest.

Construction of mine facilities (extended airstrip, wharf, concentrate storage buildings, accommodation complex, tailings disposal system and fresh-water supply system) was completed during 1980 and 1981. A service decline (15% grade) was driven parallel to the original exploration decline (20% grade) into the shallowest part of the orebody (the Panhandle Zone). In 1981 the mill and office complex, which was constructed at Trois Rivières in Quebec, was erected on a barge and floated to the mine site. First ore was fed into the mill on November 4, 1981.

Polaris, the most northerly metal mine in the world and the eleventh-largest zinc-lead producer (Northern Miner, Nov. 8, 1979), is designed to produce 170 kt of zinc concentrate and 38 kt of lead concentrate annually (Cominco Annual Report, 1980).

DESCRIPTION

The Polaris deposit is in the Cornwallis Fold Belt, a north-trending, north-plunging anticlinorium more than 650 km long that extends from the Precambrian Shield to the Sverdrup Basin (Kerr, 1977a; also see Fig. 2-27). The Cornwallis Fold Belt was formed mainly in response to the Cornwallis Disturbance (Kerr, 1977a), which involved four main pulses of differential vertical uplift during the Silurian and Devonian (Table 2-22). The uplift originated in the Precambrian crystalline basement along vertical fault zones that define the Boothia Horst (Fig. 2-27). These faults extend into the overlying Paleozoic sediments of the Cornwallis Fold Belt, changing gradually upward from vertical faults to high-angle reverse faults to overturned anticlines to asymmetric anticlines (Kerr, 1977a). The basic structure of the fold belt was modified by other types of deformation from Late Devonian to present; notably by block faulting during the Cretaceous-Tertiary Eurekan Rifting Episode.

The Polaris deposit is one of a number of zinc-lead deposits in the Cornwallis Lead-Zinc District (Fig. 2-28) that have similar geological settings and controls on mineralization. A reconstructed geological cross section through the Truro Island and Polaris deposits (Fig. 2-29) illustrates four controls on mineralization recognised by Kerr (1977b).

1) Deposits are stratabound within carbonates of the Ordovician Thumb Mountain Formation.
2) Ore is in brecciated dolostone, in contrast to the usual limestone of the Thumb Mountain Formation.

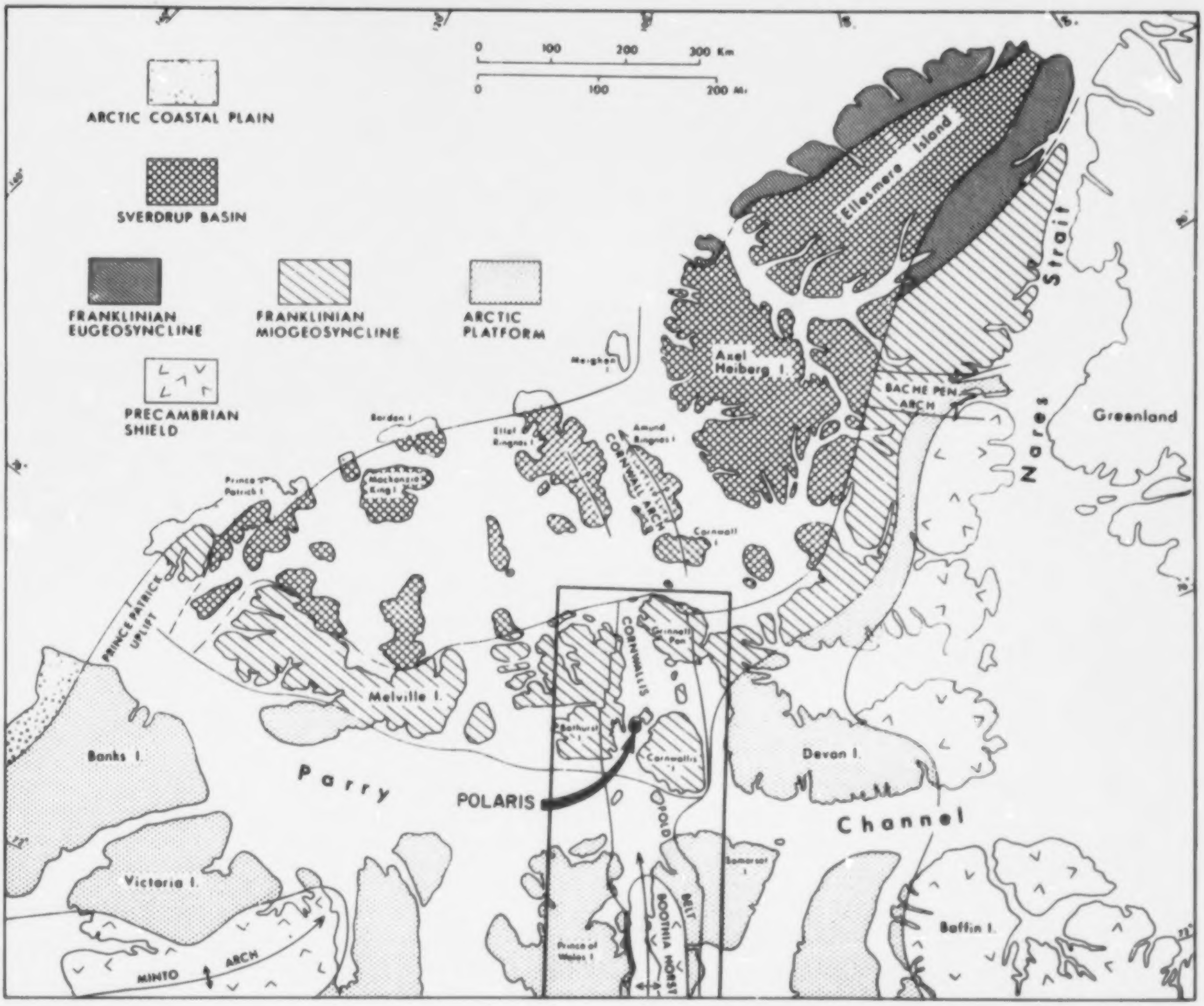

0
100
200
300 Km
0
100
200 Mi
ARCTIC COASTAL PLAIN
SVERDRUP BASIN
FRANKLINIAN EUGEOSYNCLINE
FRANKLINIAN MIOGEOSYNCLINE
ARCTIC PLATFORM
PRECAMBRIAN SHIELD
Ellesmere Island
Nares Strait
Greenland
Axel Heiberg I.
BACHE PEN. ARCH
Meighen I.
Borden I.
Ellef Ringnes I.
Amund Ringnes I.
CORNWALL ARCH
Prince Patrick I.
Mackenzie King I.
Cornwall I.
PRINCE PATRICK UPLIFT
Grinnell Pen.
CORNWALLIS FOLD BELT
Melville I.
Bathurst I.
Cornwallis I.
Banks I.
Parry Channel
POLARIS
Devon I.
Somerset I.
Victoria I.
Prince of Wales I.
BOOTHIA HORST
MINTO ARCH
Baffin I.

FIGURE 2-27: Regional geology of the Canadian Arctic Islands (from Kerr, 1977a). The north part of the Cornwallis Fold Belt (blocked-out area) is enlarged in Figure 2-28

TABLE 2-22: TABLE OF FORMATIONS AND TECTONIC EVENTS, CORNWALLIS FOLD BELT (from Kerr, 1977b)

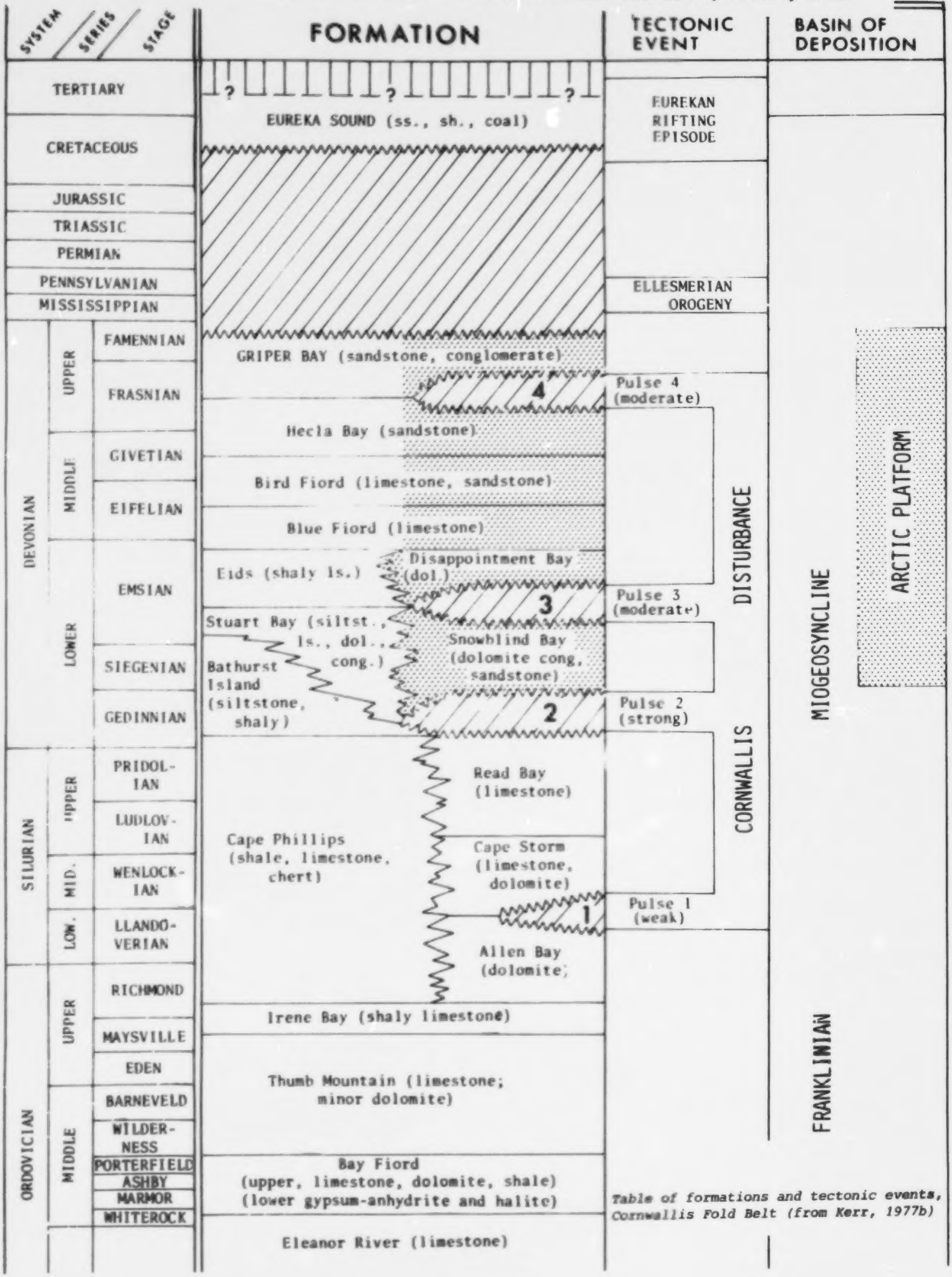

SYSTEM
SERIES
STAGE
FORMATION
TECTONIC EVENT
BASIN OF DEPOSITION
TERTIARY
CRETACEOUS
JURASSIC
TRIASSIC
PERMIAN
PENNSYLVANIAN
MISSISSIPPIAN
DEVONIAN
UPPER
FAMENNIAN
FRASNIAN
MIDDLE
GIVETIAN
EIFELIAN
LOWER
EMSIAN
SIEGENIAN
GEDINNIAN
SILURIAN
UPPER
PRIDOLIAN
LUDLOVIAN
MID.
WENLOCKIAN
LOW.
LLANDOVERIAN
ORDOVICIAN
UPPER
RICHMOND
MAYSVILLE
EDEN
MIDDLE
BARNEVELD
WILDERNESS
PORTERFIELD
ASHBY
MARMOR
WHITEROCK
?
?
?
EUREKA SOUND (ss., sh., coal)
GRIPER BAY (sandstone, conglomerate)
4
Hecla Bay (sandstone)
Bird Fiord (limestone, sandstone)
Blue Fiord (limestone)
Eids (shaly ls.)
Disappointment Bay (dol.)
3
Stuart Bay (siltst., ls., dol., cong.)
Snowblind Bay (dolomite cong, sandstone)
Bathurst Island (siltstone, shaly)
2
Read Bay (limestone)
Cape Phillips (shale, limestone, chert)
Cape Storm (limestone, dolomite)
1
Allen Bay (dolomite)
Irene Bay (shaly limestone)
Thumb Mountain (limestone; minor dolomite)
Bay Fiord (upper, limestone, dolomite, shale) (lower gypsum-anhydrite and halite)
Eleanor River (limestone)
EUREKAN RIFTING EPISODE
ELLESMERIAN OROGENY
Pulse 4 (moderate)
Pulse 3 (moderate)
Pulse 2 (strong)
Pulse 1 (weak)
CORNWALLIS DISTURBANCE
ARCTIC PLATFORM
MIOGEOSYNCLINE
FRANKLINIAN

Table of formations and tectonic events, Cornwallis Fold Belt (from Kerr, 1977b)

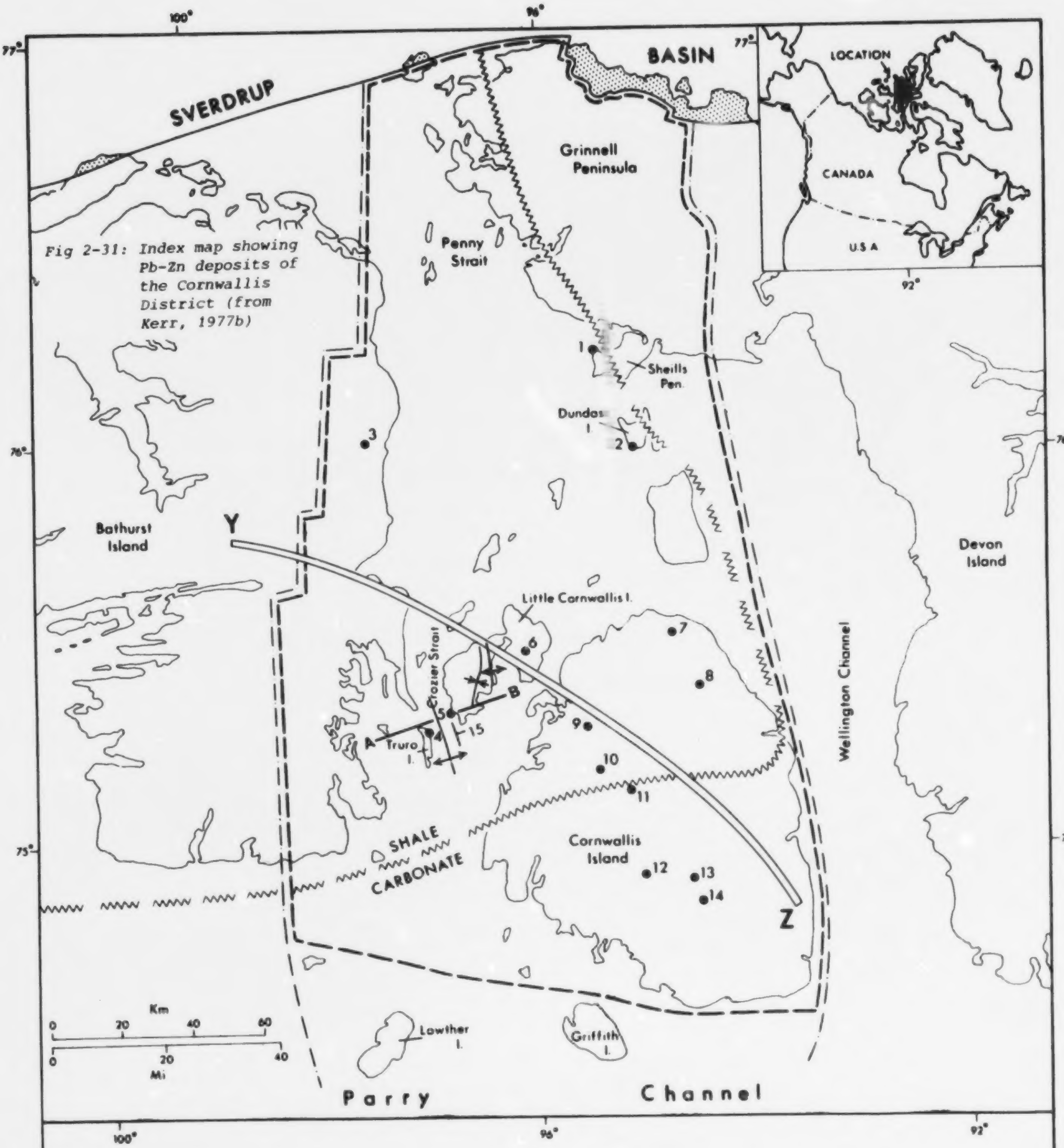

100°
96°
92°
77°
76°
75°
SVERDRUP
BASIN
LOCATION
CANADA
U.S.A
Grinnell Peninsula
Penny Strait
Sheills Pen.
Dundas I.
Bathurst Island
Devon Island
Y
Z
A
B
Little Cornwallis I.
Crozier Strait
Truro I.
15
Wellington Channel
SHALE
CARBONATE
Cornwallis Island
Lowther I.
Griffith I.
Parry Channel
Km
0
20
40
60
Mi
0
20
40
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Names of deposits and showings
● 1 Sheills Peninsula
● 2 Dundas Island
● 3 Bathurst Island
● 4 Truro Island
● 5 Polaris
● 6 Eclipse
● 7 Stuart River
● 8 Caribou
● 9 Rookery Creek
● 10 Abbot River West
● 11 Abbot River East
● 12 Taylor River
● 13 Sup
● 14 Allen Branch
Boundary of Cornwallis Lead-Zinc District
Boundary of Cornwallis Fold Belt
Upper Ordovician to Lower Devonian Facies boundary

Fig 2-31: Index map showing Pb-Zn deposits of the Cornwallis District (from Kerr, 1977b)

FIGURE 2-28: Index map showing lead-zinc deposits of the Cornwallis District. YZ is the approximate section of Table 2-22. AB is the approximate section of Figure 2-29 (from Kerr, 1977b)

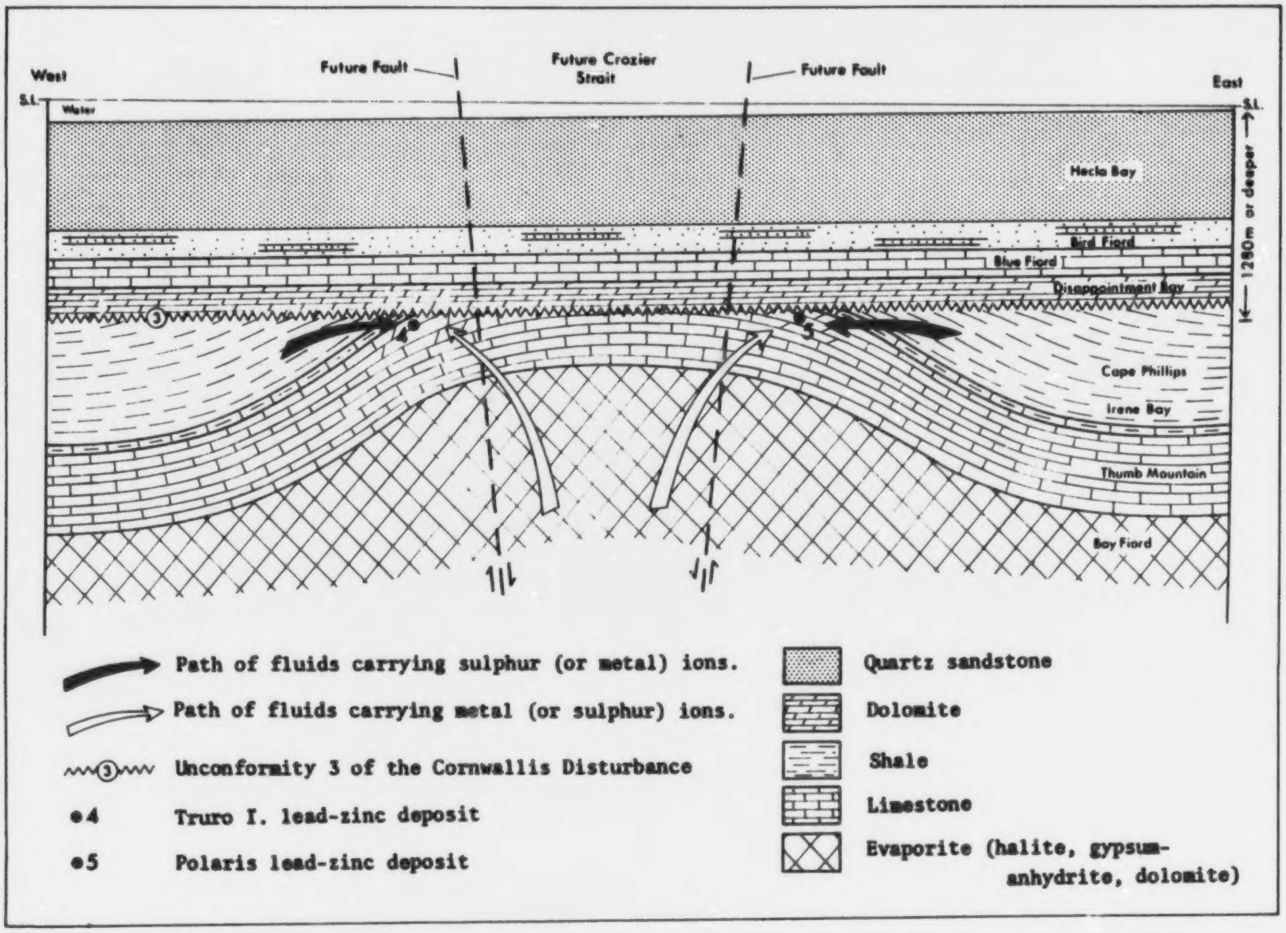

West
Future Fault
Future Crozier Strait
Future Fault
East
S.L.
Water
S.L.
Hecla Bay
Bird Fiord
Blue Fiord
Disappointment Bay
1280m or deeper
③
4
5
Cape Phillips
Irene Bay
Thumb Mountain
Bay Fiord
Path of fluids carrying sulphur (or metal) ions.
Path of fluids carrying metal (or sulphur) ions.
Unconformity 3 of the Cornwallis Disturbance
●4 Truro I. lead-zinc deposit
●5 Polaris lead-zinc deposit
Quartz sandstone
Dolomite
Shale
Limestone
Evaporite (halite, gypsum-anhydrite, dolomite)

FIGURE 2-29: Reconstructed section along AB of Figure 2-28 showing the stratigraphic position of the Truro Island and Polaris deposits (from Kerr, 1977b)

3) Deposits are close to shale of the Cape Phillips Formation, which may have been the source rock for metals.
4) The hosting Thumb Mountain Formation was subject to erosion and karstification in early Devonian time during Pulse 3 of the Cornwallis Disturbance.

An eight-stage sequence of stratigraphic and tectonic events leading to mineralization was suggested by Kerr (1977b):

1) An Ordovician to Lower Devonian geosynclinal sequence was deposited, containing formations that could be a source of Zn, Pb, Fe, and S, as well as a potential host formation.
2) The sequence was folded by three pulses of the Cornwallis Disturbance.
3) Uplift in Early Devonian time allowed deep

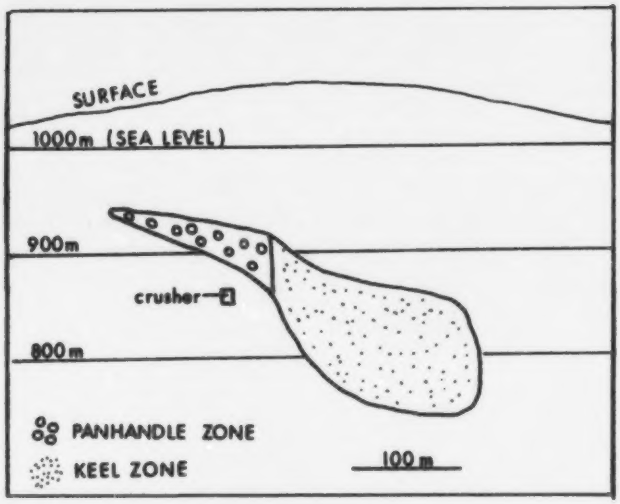

SURFACE
1000m (SEA LEVEL)
900m
crusher
800m
PANHANDLE ZONE
KEEL ZONE
100 m

FIGURE 2-30: North-facing cross section showing the shape of the Polaris deposit, Panhandle Zone and Keel Zone (from Cominco information brochure 'Welcome to Polaris')

erosion that exposed the host Thumb Mountain Formation in anticlinal culminations.

4) Caverns and pores developed in the upper part of that formation by karst-type solution.
5) During subsidence an unconformable sedimentary cover buried the host formation and its caverns to a considerable depth.
6) Two formation fluids developed, with metal ions in one and sulphur ions in the other.
7) These two brines migrated laterally and upward, and met in cavities in the Thumb Mountain Formation.
8) In these cavities temperatures and other conditions were suitable and the brines precipitated galena, sphalerite, and pyrite.

The Polaris deposit is on the western limb of a broad, north-trending syncline and is in the upper approximately 75 m of dolomitized Thumb Mountain Formation carbonates. The Thumb Mountain Formation is about 520 m thick at Polaris and the upper mineralized zone is characterized by abundant thin-shelled fossil debris. The Thumb Mountain Formation is overlain successively by about 61 m of nodular limestone and green shale of the Irene Bay Formation and by dark-coloured silty calcareous shale of the Cape Phillips Formation, which is only partly preserved beneath an unconformity (Fig 2-29). Strata strike north-northwesterly and dip 8^0 to 15^0 east.

The Polaris deposit is about 350 m long in a northwesterly direction and about 150 m wide. In cross-section (Fig 2-30), the deposit is pan-shaped and comprises the upper Panhandle Zone, about 5 to 40 m thick and beginning about 100 m below surface (50 m below sea level), and the lower Keel Zone, about 100 m thick and beginning about 200 m below surface (125 m below sea level). The Panhandle Zone contains about 4 Mt of ore and the Keel Zone about 21 Mt. Ore grade is about 14% Zn and 4% Pb (Cominco public information circular, "Welcome to Polaris").

Sulfides in the Polaris deposit include sphalerite, galena and about 5-10% pyrite or marcasite. Sphalerite is colloform except where it has crystallized to partly fill vugs in massive sections of sulfide. Galena is medium to coarse grained; iron sulfides are mainly fine grained (Muraro, 1973). The entire orebody is estimated to have a porosity of about 5% (Scales, 1982). Voids are filled with fresh-water ice, so the deposit must be exploited by dry mining techniques at sub-zero temperatures or the ground conditions will deteriorate.

Muraro (1973) considers that the sulfide minerals at Polaris were introduced into space developed in the host formation by solution and brecciation. He was the first to compare Polaris to Mississippi Valley-type deposits. Jowett (1975), who studied fluid inclusions in sphalerite from Polaris, also compared Polaris to Mississippi Valley-type deposits in general and to the Pine Point deposits in particular. He found that fluid inclusions homogenized in the range of 52^0 to 105^0 C and suggested that the ore-forming fluids were warm and slow-moving brines, probably highly saline and dense. Kerr (1977b) calculated the minimum temperature of formation at 52^0C.

CURRENT WORK AND RESULTS

Although the mill began processing ore in November of 1981, Polaris' first full year of production at commercial rates was 1983. Production and reserves for 1981 to 1983 are listed in Table 2-23, and mine development during 1982 and 1983 is summarized in Table 2-24. Operations at Polaris were routine during the years under review. Mill throughput and feed grades in 1983 were higher than forecast. Diamond drilling in 1983 upgraded 7.6 Mt of ore from the possible class to the proven and probable class of reserves.

TABLE 2-23: PRODUCTION AND RESERVES, POLARIS MINE 1981 TO 1983

PRODUCTION				RESERVES	
Year	kt Mined	kt Zn	kt Pb	kt Reserves	Grade: % Zn, Pb
1981	25.8	3.4	1.1		
1982	470.0	74.0	30.2	9,980	15.2%, 4.4%
1983	829.0	132.2	38.9	16,870	14.8%, 4.1%

NOTE: Production and reserves from Cominco annual reports. Production figures differ from those compiled by the Mining Inspection Service, Government of the NWT (Table 2-1).

TABLE 2-24: DEVELOPMENT, POLARIS MINE 1982 TO 1983

Year	Lateral Dev. (m)	Raising (m)	Slashing (m^3)	Surf Drilling (m)	UG Drilling (m)
1982	2845	124	49595	6877	2519
1983	2327	27	103642	5413	6741

SOURCE: Mining Inspection Service, Government of the NWT.

TUNGSTEN: CANTUNG

INTRODUCTION

The Cantung Mine is in one of the W-Cu (Zn) skarns along the eastern margin of the Selwyn Basin, a miogeoclinal wedge of mainly clastic, Mississippian to Proterozoic sedimentary rocks formed along the western margin of the North American craton. The Selwyn Basin is separated from facies-equivalent platformal carbonates of the Eastern Marginal Belt by a major tectonic flexure, the Redstone Arch (Fig. 2-31). Skarn deposits are associated with Upper Cretaceous quartz monzonite stocks and batholiths that intrude the Selwyn Basin. The W-Cu (Zn) skarns lie on a curvilinear trend immediately west of the Redstone Arch (Dick and Hodgson, 1982). Economically significant skarn deposits tend to form where intrusions cut limestone beds that are flat lying.

The skarns west of the Redstone Arch are fairly typical of W-Cu (Zn) metasomatic contact deposits worldwide, the characteristics of which have recently been summarized by Einaudi and Burt (1982). They are commonly in continental margin, syn- to late-orogenic tectonic settings and are associated with quartz diorite to quartz monzonite plutons and batholiths. Ore zones are devoid of cogenetic volcanic rocks. Endoskarn replacement of igneous rocks is local and limited to pyroxene and plagioclase, whereas exoskarn replacement of carbonates is extensive and typically comprises an early-formed mineral assemblage of ferrosalite-hedenbergite, grandite, idocrase and wollastonite; a late-formed assemblage of spessartine, almandine, grandite, biotite, hornblende and plagioclase; and an ore assemblage of scheelite, chalcopyrite, molybdenite and minor sphalerite, pyrrhotite, magnetite and pyrite.

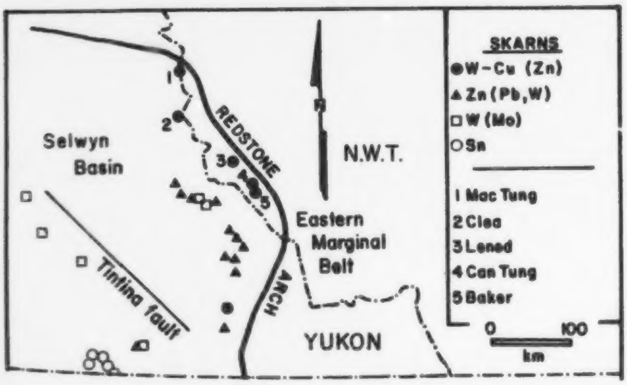


FIGURE 2-31: Tungsten skarns, eastern Selwyn Basin (from Dick and Hodgson, 1982)

Characteristics of the Cantung deposit that differ from the typical model described above include:

1) molybdenite is absent
2) pyrrhotite content is much greater than chalcopyrite or sphalerite content
3) pyrite is present only in late faults

(Pers. comm., B.F. Watson, Cantung geologist).

CANTUNG MINE

Canada Tungsten Mining Corp. Ltd.	Tungsten
P.O. Box 9	105 H/16
Tungsten, NWT	61°58'N,128°15'W

REFERENCES

Archibald and others (1978); Blusson (1968); Brown (1961); Cummings and Bruce (1977); Dawson and Dick (1978); Dick (1980); Dick and Hodgson (1982); Einaudi and Burt (1982); Gabrielse and others (1973); Gabrielse and Reesor (1974); Mathieson and Clark (1984); White (1963); Zaw (1976); Zaw and Clark (1978).

PROPERTY

Mining Leases 2449 and 3129 covering 2482 ha and comprising the following claims: AC 1-7; BC 1-8, 10-11; CED 1-49, 59-65, 67-73; EF 2, 5-8; RL 1, 3-5, 8-10, 19-20; WO 1-11.

Canada Tungsten also controls about 500 claims adjacent to or near the mining leases.

LOCATION

Cantung lies near the headwaters of the Flat River in the Selwyn Mountains, 644 km west of Yellowknife and less than 3 km east of the Yukon border. The town of Tungsten is serviced by a 306-km all-weather gravel road from Watson Lake, 209 km to the south in the Yukon Territory. A 1,219-m gravel airstrip at the minesite accommodates STOL aircraft.

HISTORY

A skarn in the floor of a mountain cirque at an elevation of 1,524 m was discovered and staked as a copper prospect for Northwestern Explorations Ltd in 1954. After exploration and drilling, the copper potential was deemed subeconomic and in 1958 the claims were allowed to lapse. Aware of scheelite in the deposit, the Mackenzie Syndicate immediately restaked the claims and Canada Tungsten Mining Corporation was formed to acquire and develop the property. Drilling and tunnelling indicated about 1 Mt grading 2.47% WO_3 recoverable by open pit mining. Mining began in November of 1962 after completion of a gravel road to the property and installation of a 275 tpd concentrator. During the early years, operations were confined to the summer months. In 1970, exploratory drilling outlined a new ore zone (E-Zone) 550 m north of and 122 m below the open pit. By 1973, further drilling from an adit had established 3.63 Mt of ore in the E-Zone grading 1.6% WO_3 and 0.22% Cu. Open-pit mining was phased out in 1974, when year-round underground operations began. By 1978 the mill capacity had been increased to 450 tpd and underground development and diamond drilling had outlined additional ore to the west, upgrading reserves to 3.8 Mt grading 1.55% WO_3. Expansion of the mill was completed in 1979, doubling capacity from 450 tpd to 900 tpd and making Cantung the largest tungsten mine in the Western hemisphere.

DESCRIPTION

The main regional structure in the Cantung area is a northwest-trending syncline cored by Cambrian limestone, flanked by Cambrian or earlier phyllite and intruded by Cretaceous quartz monzonite stocks (Fig. 2-32). At Cantung, the 'Mine Stock' has altered some of the limestone to ore-bearing skarn.

The following description is mainly after Dick and Hodgson (1982). Ore-bearing skarns at Cantung are found in two distinct lithological units: the Ore limestone, which contains the bulk of the ore, and the Swiss Cheese limestone (Fig. 2-33). The Ore limestone is a relatively pure, 70-m-thick, coarsely crystalline, massive marble of Lower Cambrian age (Blusson, 1968). The underlying Swiss Cheese limestone is an equally thick unit comprising calcareous pods and thin, discontinuous beds of calcareous rock enclosed in a non-calcareous pelitic matrix. Only the calcareous component is significantly altered to skarn which, when mineralized, is termed 'chert ore' by Cantung geologists. The Ore and Swiss Cheese limestones are sandwiched between fine-grained, brown hornfels units known as the Upper and Lower argillite. This sequence has been deformed into a recumbent anticline and slightly displaced by high-angle faults.

There are two separate orebodies at Cantung; the open pit orebody and the E-Zone orebody. The open pit orebody, on the gently-dipping upper limb of the anticline, is in both the Swiss Cheese and Ore limestone. The E-Zone orebody, on the flat-lying lower limb of the anticline adjacent to the contact with the Mine Stock, is mainly in the Ore limestone (Fig. 2-33). The thickness and grade of ore of the E-Zone orebody diminishes rapidly as the dip of the beds steepen towards the hinge of the anticline.

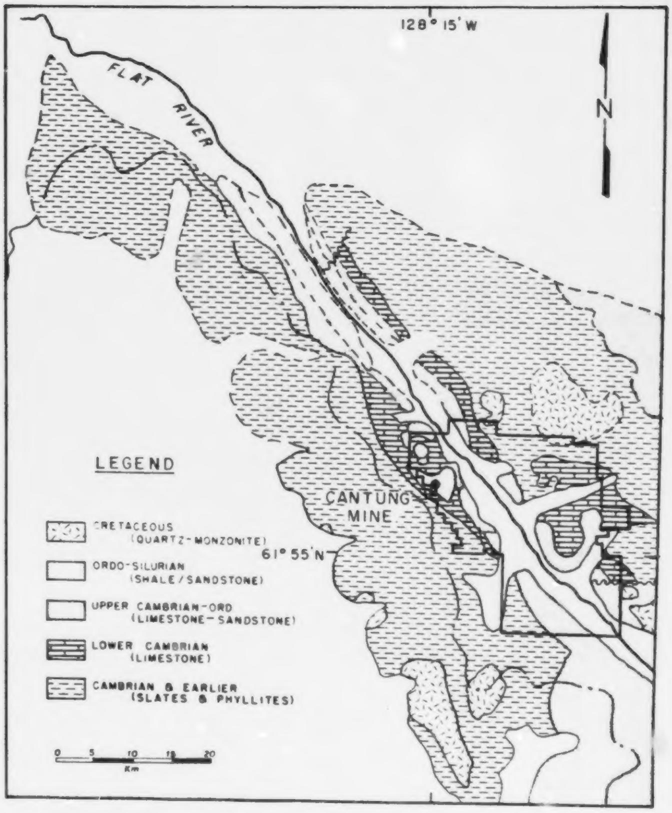

128° 15' W
N
FLAT RIVER
CANTUNG MINE
61° 55' N
LEGEND
CRETACEOUS (QUARTZ-MONZONITE)
ORDO-SILURIAN (SHALE/SANDSTONE)
UPPER CAMBRIAN-ORD (LIMESTONE-SANDSTONE)
LOWER CAMBRIAN (LIMESTONE)
CAMBRIAN & EARLIER (SLATES & PHYLLITES)
0
5
10
15
20
Km

FIGURE 2-32: Regional geology, Cantung Mine area (from Gabrielse and others, 1973)

The pit orebody is a shallowly southwest-dipping lens about 91 m wide and 20 m thick. The Ore limestone is cut by quartz-microcline-scheelite veins and is altered to a fine-grained clinopyroxene-garnet skarn containing pyrrhotite, scheelite, chalcopyrite and sphalerite. The Swiss Cheese limestone (chert ore) is lower grade and contains scheelite and pyrrhotite.

The E-Zone orebody is over 600 m long and typically 12 m thick by 60 m wide. Zaw (1976) showed that the E-Zone has an internal zoning broadly conformable to stratigraphy and comprising an upper zone of hedenbergite pyroxene and Fe-Mn-rich grossular, an intermediate amphibole-rich zone and a footwall biotite skarn. The E-Zone orebody contains scheelite, chalcopyrite, sphalerite, and non-magnetic pyrrhotite.

The Mine Stock is a quartz monzonite intrusion enveloped by an extensive thermal metamorphic aureole. It ranges from equigranular to porphyritic in texture and consists mainly of microcline, quartz, plagioclase and biotite. Quartz veinlets containing minor pyrite, arsenopyrite, scheelite and tourmaline are abundant in the stock near the skarn contacts.

Conversion of Ore limestone to skarn is considered to have taken place over a short period at a shallow depth (1000 bars) and at a temperature of 450°C. The locus of skarnification and mineralization is thought to have migrated towards the roof of the Mine Stock as it cooled (Zaw and Clark, 1978).

CURRENT WORK AND RESULTS

Production and reserves at Cantung for 1976 to 1983 are listed in Table 2-24; mine development during 1982 and 1983 is summarized in Table 2-25.

1982

Cantung posted an operating loss because of weak demand and declining prices for tungsten. By year-end, the market price for tungsten was the lowest since underground mining began in 1974. (see Table 2-3).

Underground development included driving a raise to the open pit that will be used to provide underground fill. A hydraulic backfill plant was

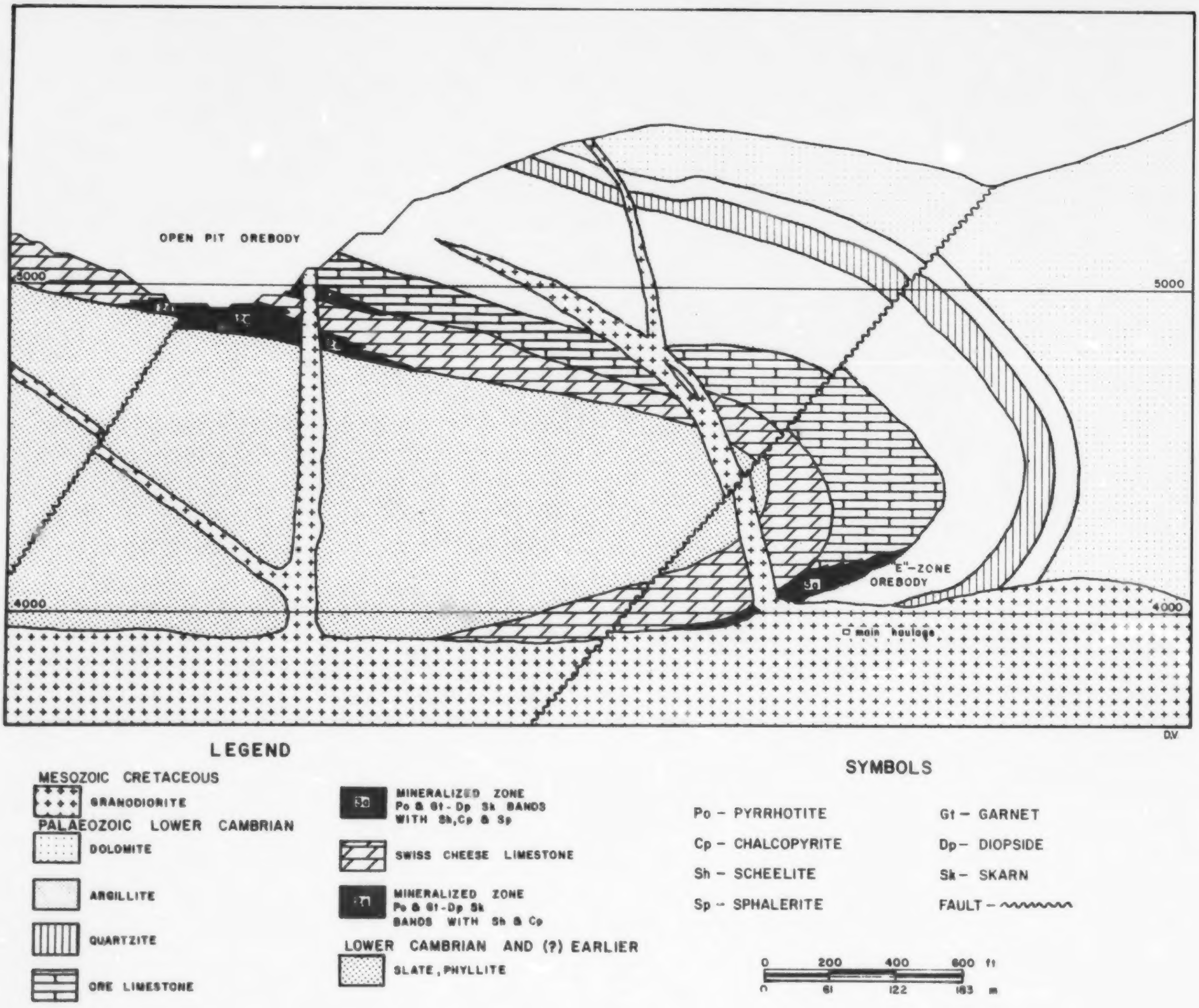

OPEN PIT OREBODY
5000
5000
4000
4000
"E"-ZONE OREBODY
main haulage
D.V.
LEGEND
MESOZOIC CRETACEOUS
GRANODIORITE
PALAEOZOIC LOWER CAMBRIAN
DOLOMITE
ARGILLITE
QUARTZITE
ORE LIMESTONE
MINERALIZED ZONE Po & Gt-Dp Sk BANDS WITH Sh,Cp & Sp
SWISS CHEESE LIMESTONE
MINERALIZED ZONE Po & Gt-Dp Sk BANDS WITH Sh & Cp
LOWER CAMBRIAN AND (?) EARLIER
SLATE, PHYLLITE
SYMBOLS
Po - PYRRHOTITE
Cp - CHALCOPYRITE
Sh - SCHEELITE
Sp - SPHALERITE
Gt - GARNET
Dp - DIOPSIDE
Sk - SKARN
FAULT - ~~~~
0 200 400 600 ft
0 61 122 183 m

FIGURE 2-33: Typical geological cross section, Cantung Mine (after Cummings and Bruce, 1977)

constructed and placed in operation during the fourth quarter. Modifications that were made to the milling circuit reduced impurities, eliminated the use of cyanide as a reagent and increased recovery to 86.6% compared to 84.5% the previous year. No significant new results were obtained from underground exploration in 1982.

A re-evaluation of ore reserves was done during the year. Revised ore reserves (Table 2-24) reflect more definitive mining plans and increased allowance for dilution.

1983

Mining and milling operations were closed January 22 because of further declines in the price of tungsten. Customers were supplied from inventories during the shutdown, which lasted until December 1, when production resumed at a reduced rate. Underground development continued during the shutdown, mostly drilling to investigate the western end of the orebody.

TABLE 2-25: PRODUCTION AND RESERVES, CANTUNG, 1976-1983

	PRODUCTION		RESERVES	
	kt milled	kt WO_3	kt reserves	grade % WO3
1976	170	2.2	3800	1.55
1977	165	2.3	3810	1.55
1978	175	2.9	3810	1.55
1979	245	3.3	3540	1.55
1980	317	4.0	3270	1.55
1981	215	2.5	3220	1.50
1982	328	3.6	2750	1.32
1983	36	0.35	2700	1.32

TABLE 2-26: MINE DEVELOPMENT, CANTUNG, 1982-1983

	lateral dev.	raising	surf. drill.	ug drill.
1982	1524 m	308 m	1437 m	12,699 m
1983	714 m	24 m	5221 m	5162 m

SOURCE: Mining inspection Service, Gov't NWT

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CHAPTER 3: NAHANNI DISTRICT

by C. Lord, Staff Geologist,
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INTRODUCTION

The Nahanni Region extends from Inuvik south to Fort Simpson and from the mountains just east of the Mackenzie River to the Yukon border. It comprises mainly the NWT part of the Cordilleran orogen.

There was little exploration in 1982 and 1983 (Fig. 3-1) as severe widespread recession affected markets for those mineral commodities (W, Pb, Zn, Cu) that are the main exploration targets in this part of the Cordillera. Canada Tungsten Corporation closed down their mining operation in January, 1983, but reopened by December.

G.S.C. Open File 868 was released in August, 1982, which resulted in a small staking rush in NTS 105 I. Canico, Amax and Aberford Resources acquired ground mainly on gold and tungsten anomalies.

The following description of properties are listed by metal commodity and geological environment as follows: 1) Stratiform shaled-hosted lead and zinc, 2) tungsten associated with skarns, and 3) gold and other minerals.

STRATIFORM, SHALE-HOSTED LEAD AND ZINC

SELWYN BASIN

Sediments of the Selwyn Basin or trough (Blusson, 1976) consist of carbonaceous calcarenite and shaly limestone of presumed deep-water origin. Minor components include argillaceous calcarenite, variegated shale and grey, green and black ribbon chert. The geology of the Howard's Pass area was mapped in 1977 by S.P. Gordey (1978).

Canex Placer's deposit at Howard's Pass is hosted in black shale-mudstone of the Road River Formation, about 60 meters above the contact with Cambro-Ordovician 'wavy-banded' limestone. The shale-mudstone occupies relatively shallow, spoon-shaped sub-basins developed on the platform-to-basin slope. A syngenetic to early diagenetic origin is postulated for these deposits.

The 'Black Clastic Unit' (Dawson, 1978) unconformably overlies the Road River Formation and consists of a lower slate unit containing minor coarse-clastic interbeds, and an upper unit consisting dominantly of coarse clastics.

The lower slate and shale units contain a barite bed which, in several areas, hosts stratiform lead-zinc deposits. Mineral occurrences have not been found in the upper coarse-clastic unit.

The barite bed in the lower unit is widespread, almost invariably at the same strati-graphic position. It ranges from thin lamellae intercalated within several metres of black shale, to massive, bedded deposits two to thirteen metres thick. Lead and zinc minerals are usually associated with the barite. Thickness and metal content probably reflect local structural, sedimentary and possibly volcanic controls.

The major deposits in the lower Black Clastic Unit, Tom and Jason, have similarities to the Devonian Meggen deposit in Germany. The Meggen model was used by companies exploring for similar deposits between MacMillan Pass and Tungsten.

FLAT LAKE PROPERTY

Placer Development Ltd.	Lead, Zinc
700-1030 West Georgia St.,	105 I/1
Vancouver, B.C.	68°7'N,128°30'W

REFERENCES

Gabrielse and others (1973); Morganti (1975).
DIAND assessment report 081621.

PROPERTY

The Flat Lake property comprises 27 PAB, 66 HUG, 23 NIP, HUB 1, OOH 1 and BEE 1 claims.

LOCATION

The property surrounds the north end of Flat Lake which is 20 kilometres northwest of Tungsten, NWT.

HISTORY

Geochemical anomalies found by Placer Development Ltd. in 1966 were staked as the PAB group. In 1979, exploration consisted of geological mapping, geochemical prospecting and diamond drilling. Five hundred and ninety six metres of drilling in five holes did not intersect any significant base metal sulphides.

In 1973, the HUG claims were staked to cover geochemical anomalies found by a survey that year. Mapping and trenching were done in 1975 and in 1978 one bore hole intersected all stratigraphic units of

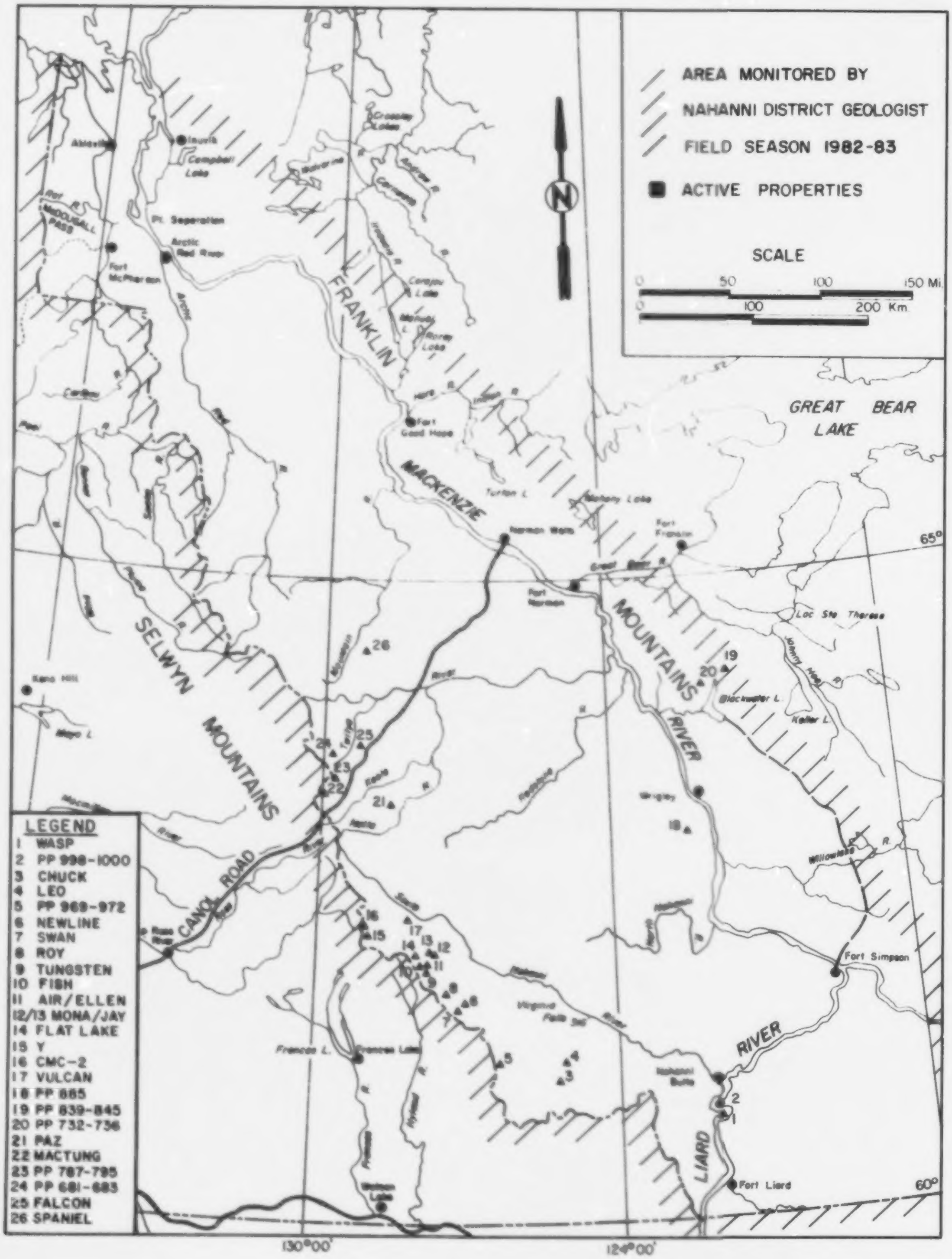

AREA MONITORED BY
NAHANNI DISTRICT GEOLOGIST
FIELD SEASON 1982-83
ACTIVE PROPERTIES
SCALE
0
50
100
150 Mi.
0
100
200 Km.
N
GREAT BEAR LAKE
FRANKLIN
MACKENZIE
MOUNTAINS
SELWYN
MOUNTAINS
MACKENZIE RIVER
LIARD RIVER
CANOL ROAD
Aklavik
Inuvik
Campbell Lake
Pt. Separation
Arctic Red River
Fort McPherson
McDOUGALL PASS
Fort Good Hope
Norman Wells
Fort Norman
Fort Franklin
Great Bear R.
Loc Ste Therese
Blackwater L.
Keller L.
Wrigley
Fort Simpson
Nahanni Butte
Fort Liard
Keno Hill
Mayo L.
Ross River
Frances L.
Frances Lake
Watson Lake
Virginia Falls
65°
60°
130°00'
124°00'
LEGEND
1 WASP
2 PP 998-1000
3 CHUCK
4 LEO
5 PP 969-972
6 NEWLINE
7 SWAN
8 ROY
9 TUNGSTEN
10 FISH
11 AIR/ELLEN
12/13 MONA/JAY
14 FLAT LAKE
15 Y
16 CMC-2
17 VULCAN
18 PP 885
19 PP 839-845
20 PP 732-736
21 PAZ
22 MACTUNG
23 PP 787-795
24 PP 681-683
25 FALCON
26 SPANIEL

FIGURE 3-1: Distribution of properties active in 1982-83

the Howard's Pass Formation except the 'Active' member (Morganti, 1975). This member hosts the lead-zinc sulphides at Howard's Pass.

DESCRIPTION

The property is underlain by similar strata as that exposed at Howard's Pass. Structurally the strata have been folded into a synclinorium, the axis of which follows the Flat Lake valley in a northwestward direction. Pervasive regional cleavage strikes 140° and dips steeply to the southwest. Severe faulting has further complicated the geology of the area.

CURRENT WORK AND RESULTS

One hundred and fifty rock and thirty-five stream sediment samples were collected and analysed for barium, vanadium, lead and zinc. Mapping and paleontological studies were also done and in 1983 stratigraphic holes were drilled to try and intersect the 'Active' member of the Howard's Pass Formation.

Y CLAIMS

Placer Development Ltd.	Lead, Zinc, Silver
700-1030 West Georgia St.	105 I/6
Vancouver, B.C.	62°28'N,129°10'W

REFERENCES

Gordey (1978); Green and others (1968); Morganti (1975).

DIAND assessment report 091189.

PROPERTY

Y 6-24, 27-30, 35-50, 60, 62-79, 88-113, 122-162.

LOCATION

The 125 claims straddle the NWT-Yukon border 80 km northwest of Tungsten. A 64 km winter road built in 1972-73 connecting Howard's Pass to the Tungsten Highway was replaced in 1977 by an all-weather road.

HISTORY

The Y claims were staked during the summer of 1972 to cover a large geochemical anomaly identified by Placer's regional exploration. In April, 1975, U.S. Steel began to contribute exploration funds with Placer continuing as manager.

DESCRIPTION

Howard's Pass lies within the Selwyn Mountains, which are carved from a sequence of northwesterly striking Proterozoic and Paleozoic sediments intruded by Cretaceous quartz monzonite and granitic stocks. The sediments have been folded on northwesterly trending thrust faults. The stratigraphy of the eastern Selwyn Basin is shown in Table 3-1.

	Green et al., 1967	Morganti 1975	Morganti, 1975
Pennsylvanian			Top of
		18b-3	Chert Pebble Conglomerate
Mississippian	T.O.S.	18b-2	Yara Peak Formation
		18b-1	Iron Creek Formation
Devonian		10b-3	Upper Chert Formation
Silurian	18b	10b-2	Flaggy Mudstone Formation
		10b-1	Howards Pass Formation
Ordovician		7b-4	Transition Formation
		7b-3	Wavy Banded Lst. Formation
		7b-2	Massive Limestone Formation
		7b-1	Lower Siltstone
Cambrian	7b		Grit Unit
Hadrynian	2 Grit Unit	2	

TABLE 3-1: STRATIGRAPHY OF EASTERN PART OF SELWYN BASIN

The main mineralized zone is on the southwest facing slope of a rounded, northwest-trending, overburden-covered ridge. Trenches bulldozed across the face of the ridge have exposed deeply weathered, black graptolitic shale. The trenches were not deep enough to penetrate the zone and thus were not reliable sources of structural information. As a result of the deep weathering, the mineralized areas are marked only by a faint gossan and locally by small amounts of secondary hydrozincite, smithsonite and cerussite.

The host rock, a black, graphitic, pyritic shale, is believed by company geologists to have been a mudstone. Lenses of black, coarsely-recrystallized limestone within the shale are about 1 m thick and probably less than 30 m long. The shale contains calcareous, pyritic nodules as large as golf balls. Thin wisps or layers of mudstone less than 5 cm thick impart a banded aspect to the limestone that underlies the ore zone. The mineralized zone lies within the Road River Formation shale which, together with the underlying banded limestone, form part of the southwest limb of a syncline. The host rocks strike northwesterly and were thought to dip steeply to the northeast, but detailed work indicates that the structure is more complex.

CURRENT WORK AND RESULTS

Detailed mapping was done in select areas in 1982. No work was done in 1983.

CMC, Z CLAIMS

Cominco Ltd.	Lead, Zinc
200 Granville St.	105 I/6
Vancouver, B.C.	62°28'N,129°05'W

REFERENCES

Gordey (1978); Green and others (1968).

DIAND assessment report 080347.

PROPERTY

10 CMC claims; 36 Z claims.

LOCATION

The claims are 80 km northwest of Tungsten and adjoin Canex Placer's XY property in the Yukon Territory.

HISTORY

The CMC claims were staked in 1972, the Z claims in 1977. In 1973, the CMC group was mapped and a geochemical soil-sampling survey was completed. Anomalies were tested by 61.3 metres of trenching in 1975.

In 1979, a total of 15,100 metres of line was cut and pegged at 25-metre spacings. Crosslines were established along the baseline at 100-metre intervals. Five hundred and ninety soil samples were collected on the grid and an additional 52 samples were collected along two pace-and-compass reconnaissance lines. Samples were assayed for lead, zinc and silver. Several soil-geochemical anomalies were outlined.

DESCRIPTION

The Road River Formation, the underlying 'wavy-banded' limestone unit and the overlying 'Black Clastic' unit outcrop on the property. All units have been tightly folded into anticlines and synclines that plunge 15° to the west. Faulting is common.

CURRENT WORK AND RESULTS

About 4,340 cubic metres of material were excavated from seven trenches. Six trenches were on the Z claims and one on the CMC claim.

No visible lead and zinc sulphides were found, although material from several trenches assayed greater than 1000 ppm Pb and 200 ppm Zn. The zinc is probably from hydrozincite coatings on the shale.

VULCAN, RX CLAIMS

Riocanex Exploration Ltd.	Lead, Zinc
520-800 W. Pender St.	105 I/8
Vancouver, B.C.	62°18'N,128°10'W

REFERENCES

Gabrielse (1973); Carne (1976) by A. Artmont (1979).

DIAND assessment report 081188.

PROPERTY

VULCAN 1-6 blocks (220 claims); RX 1-3 blocks (101 claims).

LOCATION

The claims are 50 km north of Tungsten.

HISTORY

Cyprus Anvil staked the BARBI claims in 1974 to cover lead-zinc-silver showings found on the northeast part of the present VULCAN claims. The BARBI claims lapsed after being mapped, trenched and sampled.

In 1978, Welcome North Mines Ltd. discovered a number of encouraging showings and staked 321 claims, the Vulcan property, which was optioned to Riocanex in 1979.

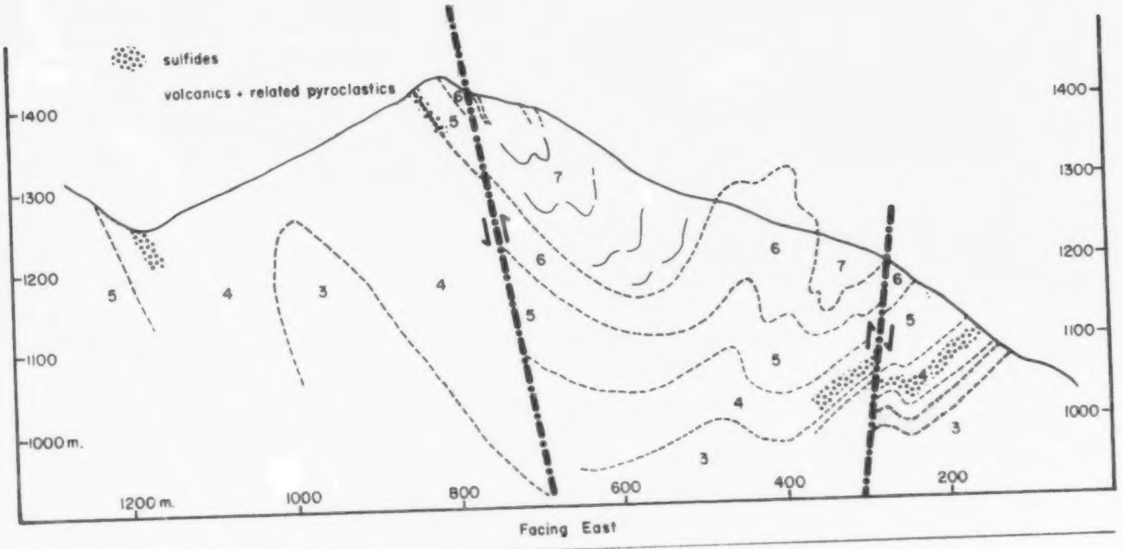
DESCRIPTION

The property lies on the west limit of the South Nahanni Anticline and covers strata ranging in age from Lake Proterozoic to Devono-Mississippian.

More than fifty galena, sphalerite, pyrite, fluorite and barite showings have been found within the stratigraphic interval from Late Cambrian to Middle Devonian. The significant showings occur at or near the contact between the Road River Formation and the underlying Sunblood Formation. Sphalerite and galena are found in chert breccias or interlaminated with chert and shales of the Road River Formation (Fig. 3-2).

Only the upper and middle members of the Sunblood Formation are present on the property. These form a stratigraphic succession 600 to 800 metres thick.

The middle member, a fine-grained, light grey to mottled dolostone with interbedded limestone, contains several volcanic flows near the top. The flows comprise dark green to rusty brown weathering, highly pyritic (up to 20%) amygdaloidal andesite and tuff that have been altered to fine-grained, chlorite-quartz-sericite schist.



7 Canol Formation (Black Clastic)
grey to black phyllitic shales, non calcareous
laminate barite/chert or blebby barite horizon
bioclastic boulder bed — debris flow.

6 "Siliceous Shales"
black shales with interbedded black chert
non calcareous.

5 Grizzly Bear Formation/uID Road River Equivalent
bioclastic limestone with minor calcareous shale
interbedded shale, calcareous shale micritic
and bioclastic limestone (crinoids with twin axial
canals).

4 Road River Formation
interbedded black shales, calcareous shales and
limestones; graptolic pale maroon to light grey
crystal and lithic tuffs ± mineralization siliceous black
shale ± mineralization

3 Sunblood Formation
light grey dolomite
amygdaloidal pyritic volcanics, green weathering.

FIGURE 3-2: Cross section of the Vulcan Property

The upper member comprises well-bedded to platy, dark grey to black argillaceous limestone and laminated, pink to grey limestone with minor dolostone, shale and siltstone interbeds.

The Road River Formation unconformably overlies the Sunblood Formation and comprises interbedded calcareous and non-calcareous, fine-grained black clastics with minor carbonates. The Road River Formation is divisible into lower, middle and upper members. The lower member consists of dark grey to black argillaceous limestone, shale and chert; the middle member of buff to orange to silvery-weathering siltstone, chert and limestone; and the upper member of fissile, black, sooty shale, limestone and calcareous tuff.

Significant deposits are hosted by siliceous black shale and tuffaceous sediments within the upper member of the Road River Formation.

The main showing found on VULCAN claims has a distinct transition along strike from massive sulphides to shale hosted sulphides to barite-fluorite-galena.

The massive sulphides are composed of fine grained pyrite (80%) with interstitial galena, sphalerite and quartz (20%).

The shale-hosted sulphides have been divided by Artmont (1979) on the basis of texture into three classes: laminated, pseudolaminated and breccia-matrix sulphides. The laminated sulphides are usually fine grained pyrite. The laminae vary in thickness from 0.1 cm to 2 cm and conform to bedding. Galena and sphalerite are found with the pyrite where the shale becomes more siliceous and less calcareous. The pseudo-laminated sulphides; pyrite, sphalerite and galena; are less conformable to bedding and in some instances cross-cut the shales. These cross-cutting veinlets appear to be controlled by the foliation.

The breccia-matrix sulphides consist of angular clasts of siliceous shale and laminated pyrite in a quartz-pyrite-sphalerite-galena-muscovite matrix. This sulphide breccia has been likened to similar ones at the Tom deposit at MacMillan Pass. Carne (1976) suggests that the breccia represents the venting area for hydrothermal fluids. In this process, the early fluids migrated through the sea floor sediments, silicified the shale and produced a self-sealing cap. Steam-blast eruptions then brecciated the sediments and allowed mineralizing fluids to discharge on the sea floor and infill the breccia.

The massive barite-fluorite-galena assemblage, at its best exposure, is 18 m thick and is composed of clear to white, coarsely crystalline barite with interstitial and vein fluorite. Galena is irregularly distributed as coarse-grained 'galena balls' up to 50 cm across. Accessory minerals are calcite, quartz and pyrobitumen.

G. Artmont of Riocanex proposes the model shown in Figure 3-3 to explain the sulphide formation and distribution.

He favours a syngenetic origin, with sulphides accumulating on an unstable shelf margin in a semi-restricted sub-basin. Epigenetic fluorite-galena veins would be formed at a later stage by structural and metamorphic processes.

CURRENT WORK AND RESULTS

Detailed mapping in selected areas of the property and relogging of some of the core was done to unravel some of the structural and stratigraphic complexities. No work was done in 1983.

PROSPECTING PERMITS 681-683

Canadian Nickel Company Ltd.	Lead, Zinc
Copper Cliff, Ontario	105 0/16
	63°55'N,129°45'W

REFERENCES

Blusson (1974); Cecile (1978); Goodfellow and others (1980).

DIAND assessment report 081638.

PROPERTY

Prospecting Permits 681-683.

LOCATION

The permits are 225 kilometres north-northwest of Ross River, Y.T.

HISTORY

Permits 681 to 683 were acquired in 1980.

DESCRIPTION

The permits cover part of the Selwyn Basin known as the Misty Creek Embayment (Cecile, 1978). The embayment is a 100 km x 150 km rectangular northwest-trending depression bounded on three sides by platformal carbonates and separated from the Selwyn Basin by a paleo-submarine ridge.

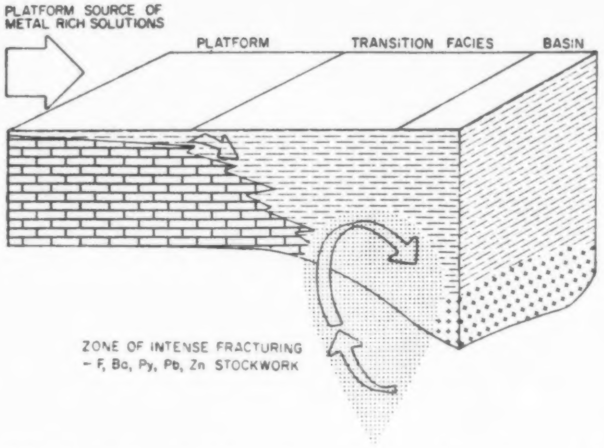

PLATFORM SOURCE OF METAL RICH SOLUTIONS
PLATFORM
TRANSITION FACIES
BASIN
ZONE OF INTENSE FRACTURING
– F, Ba, Py, Pb, Zn STOCKWORK

FIGURE 3-3: Model of sulfide formation and distribution, Vulcan property (from assessment report by G. Artmont)

Sedimentation, which took place from the Cambrian to the end of the Silurian, deposited up to 3,000 metres of fine-grained clastics. This compares to the 600 metres of carbonates deposited on the Mackenzie Platfrom during the same time.

North of Permit 681 a volcanic centre spewed out lapilli and fine-grained tuffs, breccia and amygdaloidal flows in Ordovician times.

The Misty Creek Embayment sequence of strata have been folded into tight anticlines and synclines trending northwest.

Normal and thrust faults that parallel the general strike direction of the embayment repeat the formations, particularly those in the Lower Paleozoic carbonates. This repetition is more recognizable in the carbonates than in the monotonous sequence of fine clastics of the Besa River Formation and Imperial Formation where overturning and dislocation of strata are difficult to document.

Goodfellow and others (1980) have stated that the shales of the embayment are enriched in Zn, Ag, Mo, Sb, Cd, Ba, V, Ce and Sr, in particular the Hess River Formation and Duo Lakes Formation.

Barite, as massive beds and spots, was found in the upper part of the Besa River Formation and the Hess River and Duo Lakes Formations contained pyritic nodules and interbeds.

CURRENT WORK AND RESULTS

Detailed rock sampling and prospecting traverses were done over areas of the Besa River Formation anomalous in lead and zinc.

This work, however, did not reproduce the anomalous results found by previous surveys, nor find any other anomalies. No further work was proposed for 1983.

PAZ CLAIMS

Canadian Nickel Company Ltd.	Lead, Zinc
Coppercliff, Ontario	105 P/8
	63°17'N,128°26'W

REFERENCES

Blusson (1971).

DIAND assessment report 081477.

PROPERTY

PAZ 1, 2 and 3.

LOCATION

The three claims are 83 km east of MacMillan Pass, NWT.

HISTORY

In 1974, Bethlehem Copper Corporation found several low-grade carbonate-hosted lead-zinc deposits. One of these is in the northeast part of PAZ 2.

In 1979, Welcome North Mines Ltd. found high grade lead-zinc samples in unit 10b of G.S.C. Map 133A (Fig. 3-4). This area was staked as the MAJESTY claims, and optioned to Rio Canex. The PAZ claims were staked in 1980 to cover map unit 10b, north of the MAJESTY claims.

DESCRIPTION

PAZ 1-3 are underlain by Blusson's map units 10b, 11, 12 and 14 (Fig. 3-4).

The sequence has been folded into an eastward-dipping homocline which has been cut by a north-trending steeply westward-dipping normal fault.

CURRENT WORK AND RESULTS

The claims were prospected and mapped at a scale of 1:2500. Unit 10b the host rock on the MAJESTYclaims is poorly exposed on the PAZ claims and no stratigraphic top or bottom was observed, making any correlation with the Majesty deposit impossible.

Seventeen rock samples were collected, and analysed for their lead, zinc and silver content. VLF and Max Min III EM surveys did not indicate any sulphide concentrations, neither did prospecting find any lead or zinc minerals; no further work was done in 1983.

PROSPECTING PERMITS 787-795

Kelvin Energy Ltd.	Lead, Zinc
706 - 7th Ave., S.W.,	105 P/16
Calgary, Alta., T2P 0Z1	63°30'N,129°15'W

REFERENCES

Blusson (1971); Abbott (1982); Cecile (1978). DIAND assessment report 081570.

PROPERTY

Prospecting Permits 787-795.

LOCATION

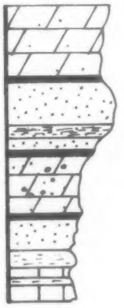
The permits are 65 kilometres northeast of MacMillan Pass (Fig. 3-5).

HISTORY

The permits were acquired in January, 1981, by Kelvin Energy Ltd. and optioned to Pan Ocean Oil Ltd., now Aberford Resources Ltd., in the fall of 1981. Regional mapping, prospecting and geochemical surveys were done that year.

DESCRIPTION

The permits cover the transition between platform carbonates and the fine grained black clastics of the Selwyn Basin (Table 3-2).



Age	Formation	Map Unit	
Cambrian	Sekwi Fm.	14	Orange weathering dolostone and siltstone. Locally has tribolites and brachiopods.
	Backbone Ranges Fm.	12	Light grey, white & pink coarse grained orthoquartzite; minor siltstone & silty shale, ± 900 m thick.
Cambrian Hadrynian			
	Sheepbed Fm.	11	Buff weathering, thick bedded dolomite in part oolitic & sandy, +150 m thick.
		10b	Dark grey, brown, green, laminated to thin bedded sst. & silty shale, minor limestone. Black dolomitic limestone near base, + 1000 m thick

FIGURE 3-4: Stratigraphy exposed on the PAZ Claims

Quaternary		Glacial Deposits
Carboniferous to Mississippian		Calcarenite Calcarenite, black calcareous shales White to brown weathering blocky quartizite
		unconformity
Middle to Upper Devonian		
Upper Earn Group	CP_{SH1}	Black calcareous shale, limestone
	DM_{SH} (DM)	Brown-rusty weathering, black sility shales that contain nodular pyrite.
	DMU	Brown-grey weathering sandstone, siltstone, conglomerate, shale
		unconformity
Middle Devonian		
Lower Earn Group	D_3	Silver weathering, siliceous, blue-black shale, regional barite horizon, sandstone
	D_2	Brown weathering, siliceous black shale, sandstone, minor conglomerate
		unconformity
Lower to Middle Devonian		
Natla-Grizzly Bear	D_{LS}	Fossiliferous limestone
		unconformity
Lower Ordovivian to Lower Silurian Road River Group Duo Formation (Transitional Facies)	OSD	Light grey, calcareous shales and siltstones (+/- volcanics)
		unconformity
Upper Cambrian to Lower Ordovician Road River Group	uCOr	
Rabbitkelle Formation		Yellow weathering linestones with pyrite nodules, and interstratified grey-black calcareous shale
Middle Cambrian Road River Group Hess River Formation		Black, pyritic, unfossiliferous shale interstratified with black, calcareous shale and rusty black shale
		unconformity
Lower Cambrian Sekwi Formation	$H_L C_S$	Dolomite, orange to grey weathering limestone, silty limestone, limestone slope breccia, quartzite
		unconformity
Lower Cambrian Backbone Ranges Formation	$H_L C_S$	Reddish-brown quartzite and sandstone

TABLE 3-2: STRATIGRAPHIC SECTION OF PROSPECTING PERMITS 787-795

The rocks have been folded along northwest-trending axes into tight synclines and anticlines. Faults are common.

CURRENT WORK AND RESULTS

A stream sediment sampling survey was successful in detecting four mineral showings. Two were nodular barite horizons, the other two zinc in the form of sphalerite and hydrozincite infilling fractures in carbonates and as coatings on shale outcrops. No further work was recommended for 1983.

TUNGSTEN ASSOCIATED WITH SKARN

Tungsten-bearing skarns are associated with a belt of small Cretaceous quartz monzonite and granodiorite intrusions along the hinge between late Proterozoic to Paleozoic, predominantly fine clastic rocks of the Selwyn Basin and equivalent-aged carbonates of the Mackenzie Platform (Fig. 3-5). This transition zone is also the locus for important base metal deposits, i.e., Howard's Pass, Tom and Jason.

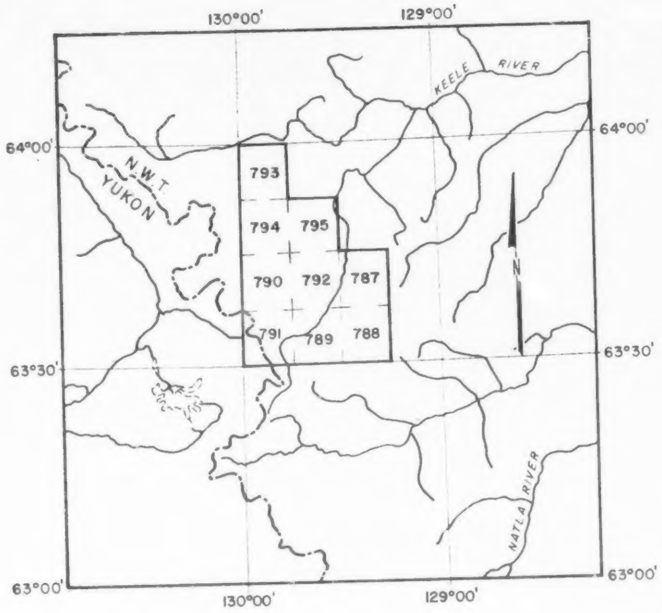


FIGURE 3-5: Location sketch of Prospecting Permits 787-795

The Tungsten, Mactung and Lened deposits account for most of the free world's production and reserves of tungsten, making this region economically and strategically important. The severe climate, remoteness, lack of infrastructure and consequent high operating costs are obstacles that must be overcome to bring some of these deposits into production.

Intrusions, predominantly quartz monzonite plutons, were emplaced into relatively unmetamorphosed rocks and formed extensive contact metamorphic aureoles (Dick and Hodgson, 1978).

Tungsten-bearing skarns formed in calcareous rocks adjacent to the plutonic contact. The more significant deposits formed where the pluton intersected calcareous strata at a shallow angle. Usually the skarns are dark green in colour and comprise calcium, magnesium and iron-bearing silicates such as pyroxene, garnet, actinolite and biotite.

Scheelite is the principle tungsten-bearing mineral, although ferberite, a mineral of the wolframite series, has been identified at Mactung.

Chalcopyrite, pyrite and pyrrhotite are associated with the skarns but their abundance is unrelated to the amount of scheelite present.

SWAN CLAIM

Memo Resources Ltd.	Tungsten
2855 King Edward Ave.	95 E/11
Vancouver, B.C., V6L 1V1	$61^{0}33$'N,$127^{0}27$'W

REFERENCES

Blusson (1968); Gabrielse and others (1973). DIAND assessment report 081661.

PROPERTY

SWAN 1.

LOCATION

The claim is 75 kilometres southeast of Tungsten, NWT.

HISTORY

The claims was staked in 1981, although the area had been prospected in 1959 by the Mackenzie Syndicate.

DESCRIPTION

Most of the claim is underlain by a granodiorite pluton. At the northwest corner of the claim the pluton is in contact with cherty calc-silicate rocks of the Sekwi Formation. The Rabbitkettle Formation overlies these skarnified carbonates.

CURRENT WORK AND RESULTS

Airborne magnetometer and VLF-EM surveys were done over the claim.

FISH CLAIMS

Canada Tungsten Mining Corp.	Tungsten
1600, 1066 W Hastings Street,	105 H/16
Vancouver, B.C. V6E 3X1	$61^{0}50$'N,$128^{0}18$'W

REFERENCES

Blusson, S.L. (1967).

DIAND assessment report 081554.

PROPERTY

FISH 1 to 23, FISH B.

LOCATION

The claims are 7 kilometres northwest of Tungsten, NWT.

HISTORY

FISH claims 1-23 were staked in 1975 and FISH B in 1977.

DESCRIPTION

The claims cover the northeasterly dipping limb of an overturned syncline whose stratigraphy is similar to that found at the Tungsten mine (Fig. 3-6).

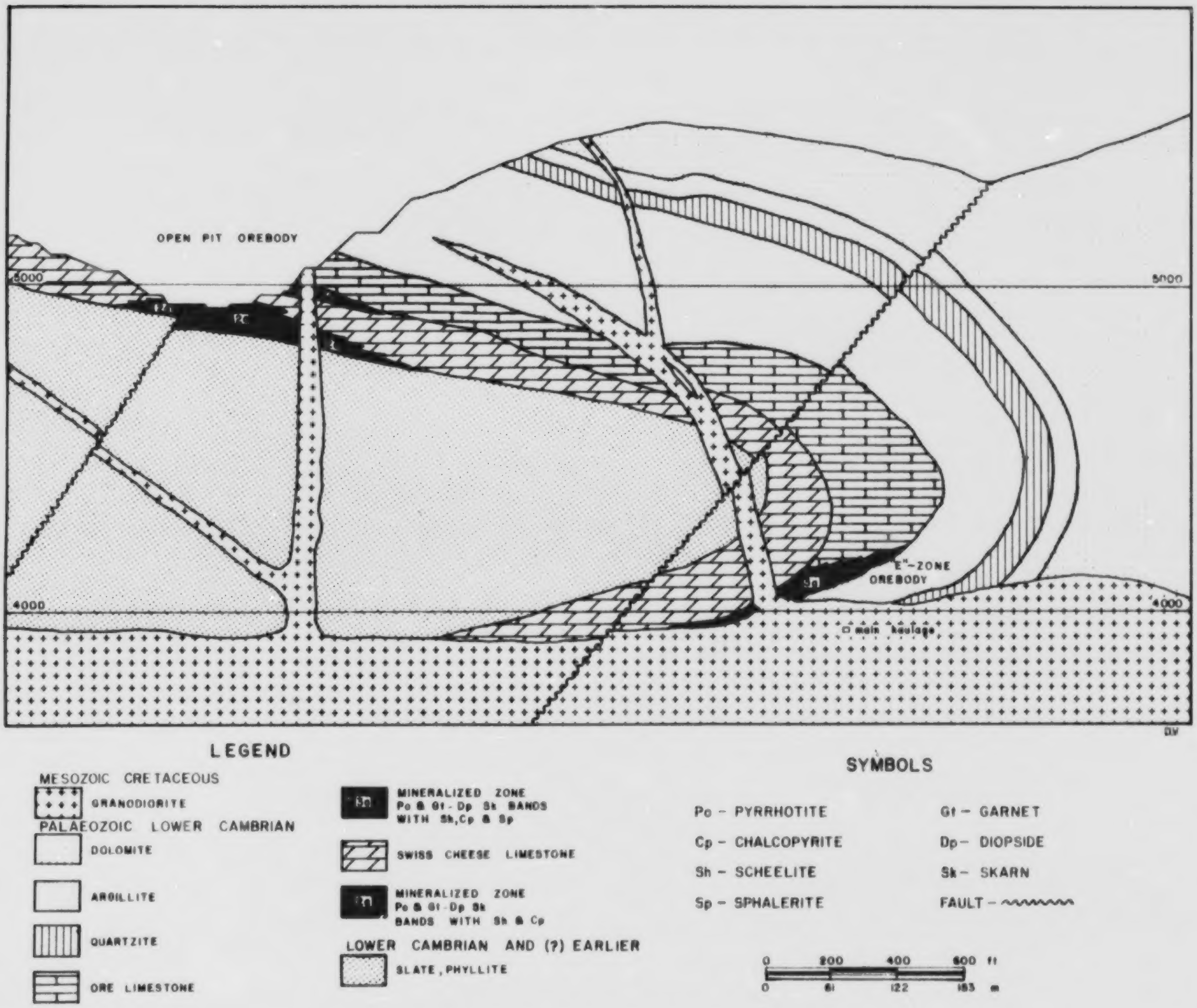

OPEN PIT OREBODY
5000
5000
"E"-ZONE OREBODY
4000
4000
main haulage
DV
LEGEND
MESOZOIC CRETACEOUS
GRANODIORITE
PALAEOZOIC LOWER CAMBRIAN
DOLOMITE
ARGILLITE
QUARTZITE
ORE LIMESTONE
MINERALIZED ZONE Po & Gt-Dp Sk BANDS WITH Sh,Cp & Sp
SWISS CHEESE LIMESTONE
MINERALIZED ZONE Po & Gt-Dp Sk BANDS WITH Sh & Cp
LOWER CAMBRIAN AND (?) EARLIER
SLATE, PHYLLITE
SYMBOLS
Po - PYRRHOTITE
Cp - CHALCOPYRITE
Sh - SCHEELITE
Sp - SPHALERITE
Gt - GARNET
Dp - DIOPSIDE
Sk - SKARN
FAULT -
0 200 400 600 ft
0 61 122 183 m

FIGURE 3-6: Cross-section of Cantung Mine

Two granite stocks, the 'Circular' and 'Mine', intrude the sequence.

Exploration targets were tungsten skarns possibly developed in the Swiss Cheese and Ore limestones (Fig. 3-6).

The Swiss Cheese limestone has an outcrop width of up to 100 metres and has been altered to a garnet-bearing pale-green siliceous skarn at its upper contact with the Ore limestone.

Overlying the Swiss Cheese limestone, the Ore limestone comprises grey-weathering, banded, coarse grained, crystalline limestone with minor calcsilicate alteration on the upper and lower contacts. The outcrop varies in width from less than 10 metres northwest of the open pit to over 65 metres in the northwest of the claim block.

The Rabbitkettle Formation overlies the Mine sequence and several small siliceous garnet skarns with minor pyrrhotite, scheelite, chalcopyrite and molybdenite formed at the contact with the Circular stock.

CURRENT WORK AND RESULTS

The claims were prospected and mapped at a scale of 1:4800. A bore hole drilled in 1983 for 786 metres, tested the contact between the Ore limestone and Circular stock.

AIR, ELLEN CLAIMS

Canada Tungsten Mining Corp. Ltd.	Tungsten
303 - 535 Thurlow St.,	105 H/16
Vancouver, B.C.	62^{0}00'N,128^{0}03'W

REFERENCES

Blusson (1968).

DIAND assessment report 081545.

PROPERTY

AIR 32-37, 53-65, 69, 81, 85-96, ELLEN 1.

LOCATION

The AIR Claims at Tungsten adjoin the southern boundary of Cantung's mine leases.

HISTORY

The claims were staked in 1975 and geochemically surveyed in 1977 and again in 1980.

DESCRIPTION

The Swiss Cheese limestone (Fig. 3-6), a carbonate member of the Sekwi Formation, outcrops on the claims. This is overlain by argillites, siltstones and dolostones of the Upper Sekwi Formation. The Rabbitkettle Formation unconformably overlies the Sekwi Formation.

CURRENT WORK AND RESULTS

One diamond drill hole totalling 763.42 metres intersected the Swiss Cheese limestone-quartz monzonite pluton contact.

MACTUNG DEPOSIT

Amax Northwest Mining Co. Ltd.	Tungsten
601 - 535 Thurlow St.	105 0/8
Vancouver, B.C.	$63^{0}17'N,130^{0}07'W$

REFERENCES

Blusson (1971); Harris (1977).

DIAND assessment report

PROPERTY

BORDER 11; GUM 1-8; GUT 1-24; PIX 1-30; PUP 1-14; EAGLE 1; CANOL 1; POND 1; GRAYLING 1.

LOCATION

This property straddles the Yukon-NWT border 11 km north of the Canol road at MacMillan Pass. Access to the claims is by road from Ross River, 208 km to the southwest, or from an airstrip at MacMillan Pass.

HISTORY

Scheelite showings discovered in 1963 by J.F. Allan were staked by Southwest Potash Corporation, a subsidiary of American Metal Climax Incorporated. The claims were transferred to Amax Exploration Inc. in March of 1967. Amax Exploration changed its name to Amax Potash in 1971, and in 1972 transferred its ownership to Amax Northwest. Mining lease 2605, Lot 166, covers 572 hectares of the property.

Surface sampling and mapping in 1963-64 was followed by almost 10,600 metres of diamond drilling in 1968 and 1971-73. In 1973, 735 metres of underground workings were driven and 272 tonnes were mined for mill tests. At the end of 1973, Amax announced ore reserves of 27 million tonnes grading 0.90% WO_3. In 1982, these reserves were updated to 60 million tonnes of 0.90% WO_3.

DESCRIPTION

A Cretaceous quartz monzonite stock intrudes Late Proterozoic to Paleozoic miogeosynclinal strata. The Paleozoic rocks are mixed shale and carbonate representing the facies boundary between the Selwyn Basin clastics and the Mackenzie Platform carbonates.

The carbonates have been altered to skarn and contain an Upper Ore Zone comprising three tungsten-bearing lenses and a Lower Ore Zone consisting of a single tungsten-bearing horizon (Fig. 3-7).

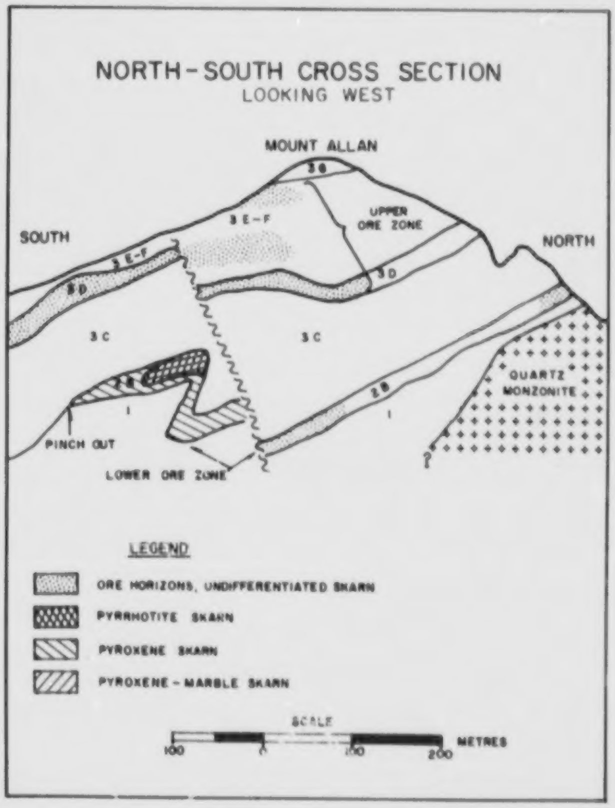

NORTH-SOUTH CROSS SECTION
LOOKING WEST
MOUNT ALLAN
3G
3 E-F
UPPER ORE ZONE
SOUTH
NORTH
3 E-F
3D
3D
3 C
3 C
2B
2B
1
1
QUARTZ MONZONITE
PINCH OUT
LOWER ORE ZONE
?
LEGEND
ORE HORIZONS, UNDIFFERENTIATED SKARN
PYRRHOTITE SKARN
PYROXENE SKARN
PYROXENE-MARBLE SKARN
SCALE
100
0
100
200
METRES

FIGURE 3-7: Cross-section of Mactung

The bottom and top of the Lower Ore Zone coincide with the contacts of a brecciated limestone unit. Pyroxene-marble, pyroxene and pyrrhotite skarn can be recognized, as well as minor cherty and chloritic skarn. Although the pyroxene skarn is the predominant type, the pyrrhotite skarn forms the high-grade core.

The Upper Ore Zone is separated from the Lower Ore Zone by 78 m of barren hornfels. The three tungsten-bearing units of the Upper Ore Zone are separated from one another by 18 m of barren argillite and hornfels. The top two units consist of layers of scheelite-bearing pyroxene skarn up to 25 cm thick with intervening barren hornfels or low-grade cherty skarn. The bottom layer contains disseminated scheelite in limestone breccia beds up to 1 m thick and in skarn beds up to 25 cm thick.

CURRENT WORK AND RESULTS

Surveys for mine and mill were done in preparation for development in the mid 1980's and regional mapping was done to the south around the Canol Road.

GOLD AND OTHER MINERALS

Exploration for placer gold was mainly by Hudson Bay Exploration and Development on the Liard River whilst vein-type gold was sought after by independent prospectors around the Cretaceous intrusives near Tungsten. Other exploration companies had regional programs looking for perhaps a Carlin type deposit around the Skinboat Lakes - Caribou River area of the South Nahanni.

Included in this section are reports on diamond, barite and multi-metal vein type exploration.

PROSPECTING PERMITS 998-1000

Hudson Bay Exploration	Gold
and Development Co. Ltd.	95 B/14
Toronto-Dominion Centre	$60^{0}45'$N,$123^{0}30'$W
Toronto, Ontario M5K 1B8	

REFERENCES

Lord (1982).

DIAND assessment report 081744.

PROPERTY

Permits 998-1000.

LOCATION

The permits cover part of the Liard River near Flett rapids, approximately 80 kilometres south of Nahanni Butte.

HISTORY

Gold has apparently been periodically mined from gravel bars along the Liard River since the early thirties (Lord, 1982). The permits were acquired in 1983.

DESCRIPTION

The permits are underlain predominantly by glacial fill with some lacustrine clays exposed on permit 998. The river banks consist of well-sorted gravels overlain by different thicknesses of silt. The river has many mid-channel and point bars presently developing.

CURRENT WORK AND RESULTS

The banks of the Liard River were sampled between Flett Rapids and Nahanni Butte at 1 km intervals on both sides of the river.

One hundred and sixty-nine sites were sampled and an average of 3.73 samples of .01 cubic meters of material were taken at each site. All samples were panned and the number of gold particles recorded.

Gold was found to be concentrated in the youngest point bars at the gravel silt interface. The gold is fine and flaky with an estimate of between 30,000 to 150,000 colours equal to 1 g of gold.

WASP CLAIMS

D. Turner	Gold
G.P.O.	95 B
Fort Simpson, NWT	$60^{0}50'$W,$123^{0}00'$N

REFERENCES

Lord (1982).

DIAND assessment report 081639.

PROPERTY

WASP 1 and 2.

LOCATION

The WASP claims cover gravel bars on the Liard River.

HISTORY

The claims were staked in 1980.

DESCRIPTION

The gravel bars covered by WASP 1 and 2 are sorted gravels of varying sizes. They have accumulated in a typical point bar situation. Fine gold accumulates in higher concentrations on the leading edge of these bars.

FIGURE 3-8: Vegetated abandoned point bars of the Liard River near Flett Rapids

CURRENT WORK AND RESULTS

One hundred and ninety-five cubic meters of gravel moved by two dredges and 194 cubic meters of gravel from two trenches were put through a sluice box.

Assays of the concentrate contained up to 10.423 g/ton Au and 3.291 g/t Ag.

CHUCK CLAIMS

Severn Ltd. Gold,Copper
Vancouver, B.C. 95 D/15
60°57'N,126°36'W

REFERENCES

Gabrielse and others (1973).
DIAND assessment report 081665.

PROPERTY

CHUCK 1 and 2.

LOCATION

The claims are 143 kilometres southeast of Tungsten, NWT, on a west-flowing tributary of the Caribou River.

HISTORY

The claims were staked in 1981 when Severn did detailed silt sampling, prospecting and geological mapping.

DESCRIPTION

The rocks on the property have been folded into a south plunging, open anticline (Fig. 3-9). The Lower Cambrian Sekwi Formation, which is exposed in the core of the anticline, consists of a sequence of dark green vesicular andesite and basalts interbedded with grey limestones and tuffs.

Chlorite-epidote alteration is common in the andesites, which in some areas are intensely silicified and sericitised. Limonite, jarosite and hematite are found in these silicified areas.

A sandy dolostone marks the top of the Sekwi Formation, which is overlain by the carbonates of the Rabbitkettle Formation.

To the north of the property the South Skinboat Pluton intrudes these sediments and volcanics.

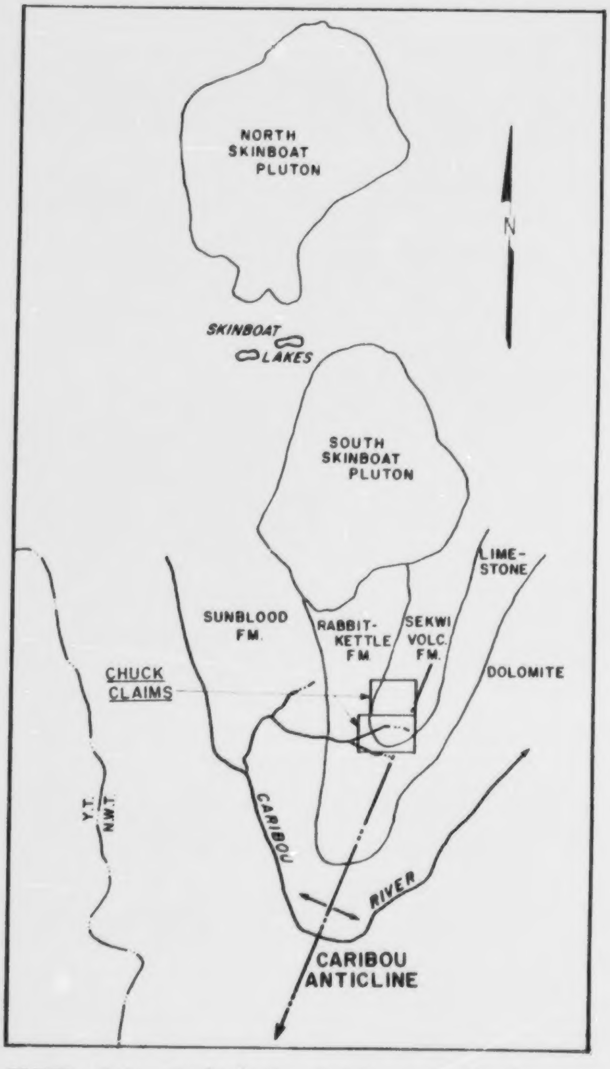

NORTH SKINBOAT PLUTON
N
SKINBOAT LAKES
SOUTH SKINBOAT PLUTON
LIME-STONE
SUNBLOOD FM.
RABBIT-KETTLE FM
SEKWI VOLC. FM.
DOLOMITE
CHUCK CLAIMS
Y.T.
N.W.T.
CARIBOU
RIVER
CARIBOU ANTICLINE

FIGURE 3-9: Geological sketch map of the area surrounding the Chuck claims

CURRENT WORK AND RESULTS

The claims were prospected and detailed geochemical surveys were done over gold anomalies found by previous regional surveys.

Pyrite, pyrrhotite, malachite, chalcopyrite and magnetite were found as disseminations and fracture and amygdule fillings in the volcanics of the Sekwi Formation.

Visible fine gold was panned from silt in a creek on CHUCK 1, and although gold was found by analysing some of the silicified and sericitised volcanics no visible gold was found in hand specimen.

The highest gold content found from 25 rock samples was 0.62 ppm Au.

PROSPECTING PERMITS 969-972

Esso Resources Canada Ltd.	Gold, Lead, Zinc
237 - 4th Ave. S.W.,	95 E/2
Calgary, Alta.	61°00'N,127°00'W

REFERENCES

Gabrielse and others (1973).

DIAND assessment report 081741.

PROPERTY

Prospecting permits 969-972.

LOCATION

The permits are centred around Skinboat Lakes, which is 92 kilometres southwest of Tungsten, NWT.

HISTORY

The permits were acquired in 1983.

DESCRIPTION

The permits cover that part of the Selwyn Basin between the Caribou and Flat River areas of the Mackenzie Mountains.

The recessive clastics of the Road River Formation (Fig. 3-10) are overlain by a thick carbonate sequence of the Rabbitkettle and Sunblood Formations. The whole sequence has been intruded by a large Cretaceous pluton centred around the Borden and Canyon Creek areas.

The outcrop is usually restricted to high ridges, knolls and plateaux. The major valleys have been glaciated and filled with up to 30 m of stratified glacial fill, including kames and eskers.

CURRENT WORK AND RESULTS

Thirty-six rock-chip samples collected from numerous traverses were analysed for Au, Ag, Pb, Zn and W from the coarse, heavy-minerals separates and for Au, Ag, As, Pb, Zn, Cu and Mo from the silt fraction. This geochemical program detected three areas anomalous in gold, zinc and tungsten. The gold around the mouth of Gold Creek was attributed to reworking of placer concentrations from the glacial till.

The zinc around Gold Creek and along the Caribou River came from smithsonite coatings on the fine grained clastics of the Road River Formation. 'Spot highs' for tungsten probably indicate skarn-type deposits in the carbonates close to the pluton. No further work was recommended for 1984.

FIGURE 3-10: Road River Formation exposed by the Caribou River

LEO CLAIMS

L. Schimanek	Gold
c/o G.P.O.	95 E/8
Fort Simpson, NWT	61°15'N,126°15'W

REFERENCES

Gabrielse and others (1973).

DIAND assessment report

PROPERTY

LEO 1 and 2.

LOCATION

The claims border the north and west shores of Clarke Lake (Fig. 3-11), which is 280 km west of Fort Simpson, NWT.

FIGURE 3-11: Clarke Lake; recessive shales in the foreground, granitic intrusions in the background

FIGURE 3-12: Immature gravels exposed on Moose Creek

HISTORY

The claims were staked in 1981.

DESCRIPTION

These placer claims cover several small misfit streams which drain eastwards from a large quartz monzonite intrusion 8 km to the west. The gravel is typically poorly sorted and has a high sand content (Figs. 3-12 and 3-13).

CURRENT WORK AND RESULTS

Three creeks crossing the claims were panned for gold. An occasional flake of fine gold was found.

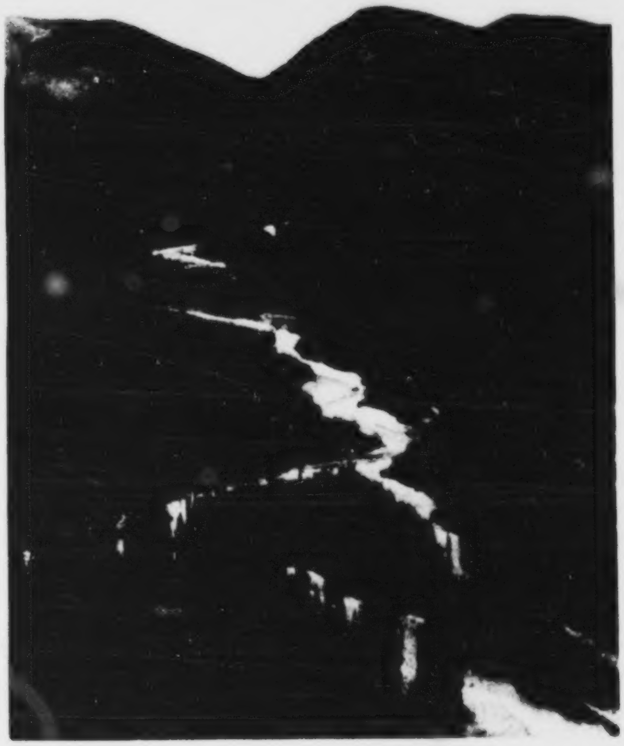


FIGURE 3-13: Gravelly sand exposed on Grizzly Creek

MONA CLAIM

Alex Black
Box 634
Watson Lake, YT YOA 1CO

Gold, Silver, Lead
105 I/1
62°06'N,128°7'W

REFERENCES

Gabrielse and others (1973).

DIAND assessment report

PROPERTY

Mona 1.

LOCATION

The claim is 20 kilometres north of Tungsten, NWT.

HISTORY

The claim was staked by A. Black in 1981 and transferred to Goldex Resources the same year.

DESCRIPTION

The claim is underlain by greenish-black shales and quartzites intruded by a quartz monzonite stock in the northeast corner of the claim.

CURRENT WORK AND RESULTS

A trench was dug in the shales and several arsenopyrite veins were uncovered. Samples of these veins contained up to 8.5 ppm Au and 88.9 ppm Ag.

JAY CLAIMS

Alex Black
c/o Watson Lake, YT

Lead, Zinc, Gold,
Silver
105 I/1
62°05'N,128°12'W

REFERENCES

Gabrielse (1973).

LOCATION

The claims are 24 km northwesterly from Tungsten.

HISTORY

JAY 5, 6, 11 and 12 were staked in 1973.

DESCRIPTION

The claims are underlain by greenish black and gray fissile shales and quartzites intruded by a quartz monzonite stock.

Numerous small (1 cm - 15 cm) minor veinlets composed of quartz with zinc, lead and silver cross cut the local foliation in these shales.

Gold is associated with some of the veins.

CURRENT WORK AND RESULTS

Three small trenches were dug on JAY 6. Samples from the trenches contained up to 4.8 ppm Au, 718.2 ppm Ag, 14.3% Pb and 3.08% Zn.

Further prospecting and sampling was done in 1983.

ROY GROUP

Logan Mines Ltd.
2830 West 37th Ave.,
Vancouver, B.C. V6N 2T6

Silver, Lead,
Zinc, Gold
95 E/12
61°37'N,127°40'W

REFERENCES

Gabrielse and others (1973).

DIAND assessment report 081552.

PROPERTY

ROY 1-17, RON 1.

LOCATION

The property is 50 kilometres south of Tungsten, NWT.

HISTORY

The ROY claims were staked in 1979 and the RON in 1981. In 1980 and 1981 the claims were mapped and geochemical and geophysical surveys done.

DESCRIPTION

The claims are underlain by carbonates of the Rabbitkettle Formation, which apparently unconformably overlies the coarse clastics and carbonates of the Sekwi Formation. Numerous small aplitic dykes cut these strata. A large Cretaceous intrusion lies 3 kilometres south of the ROY claims. Three faults have been mapped on the property, one marked by a zone of brecciation up to 20 metres in width.

Silver, lead and zinc sulphides are found in this breccia as massive lenses and fracture fillings.

CURRENT WORK AND RESULTS

A total of 154 soil samples were taken from two grids and analysed for gold, silver, lead and zinc. Permafrost prevented the excavation of deep trenches in these areas.

NEWLINE CLAIM

D. Taylor
c/o Watson Lake
Yukon Territory

Lead, Zinc,
Copper, Silver
95 E/11
61°33'N,127°30'W

REFERENCES

Gabrielse and others (1977).

DIAND assessment report 081651.

PROPERTY

Newline 1.

LOCATION

The claim is 75 kilometres southeast of Tungsten.

HISTORY

The claim was staked in 1983.

CURRENT WORK AND RESULTS

Samples taken from two trenches blasted in gossanous limestone contained up to 14.80% Zn, 3.56% Pb, 0.89% Cu, and 30.1 ppm Ag.

PROSPECTING PERMITS 837, 839-845.

Horley E. Pyett	Diamonds
263 Lake Avenue	95 O/14, 96 B/4
Kelowna, B.C.	63°52'N,123°15'W

REFERENCES

Cook and Aitken (1977), Douglas and Norris (1962).

DIAND assessment report 081631.

PROPERTY

Prospecting Permits 837, 839-45.

LOCATION

The permits are northwest of Blackwater Lake, 80 kilometres north of Wrigley, NWT.

HISTORY

The permits were acquired in 1981.

DESCRIPTION

The geology of the permit area consists of a sequence of isoclinically folded coarse and fine grained Cambrian clastics overlain by the massive bedded dolostones of the Mount Kindle Formation. Devonian carbonates overlie the Mount Kindle Formation. These strata outcrop along the McConnell Range. The valleys have been covered by glacial till up to a depth of 41 metres.

CURRENT WORK AND RESULTS

The permits were explored by geochemical prospecting, mapping and heavy mineral sampling. Kimberlite outcrops were not found, although chrome diopsides and pyrope garnets were found in the aluvial samples.

PROSPECTING PERMITS 732-733, 735-736

Diapros Canada Ltd.	Diamonds
Box 28, Toronto Dominion Centre	96 B/4, 96 C/1
Toronto, Ontario M5A 1B8	64°07'N,124°00'W

REFERENCES

Cook and Aitken (1977), Douglas and Norris (1968), McCallum (1976), Rutter and Boyden (1972).

DIAND assessment report 081636.

PROPERTY

Prospecting Permits 732, 733, 735 and 736.

LOCATION

The permits are 100 km south-southeast of Fort Norman.

HISTORY

An airborne magnetic survey was flown in the spring of 1979 over the area now covered by the permits. The permits were acquired in 1980.

DESCRIPTION

The permits lie within the north-trending, deeply dissected plateau of the McConnell Range. Maximum elevations are approximately 1000 metres with steep slopes rising as much as 300 metres above the valley floor.

Glacial drift blankets most of the area with Devonian and Ordovician limestones and dolostones outcropping usually on the large plateaus.

There have been at least two Laurentide ice advances from the east (Rutter and Boyden, 1972). The first and most extensive is exposed as grey-black stony till containing shale fragments derived from the lowlands east of the McConnell Range.

The second, is recorded as surface deposits of light-grey-brown calcareous till indicative of local derivation, and some Precambrian igneous and metamorphic boulders that have their source some 300 km to the east.

CURRENT WORK AND RESULTS

A total of 2400 glacial sediment samples collected at 100-metre intervals along lines 100 metres apart determined that the distribution of kimberlitic minerals in the area had no regular pattern and that the type and number of kimberlitic minerals vary considerably from one sample site to another. A total of 53 bore holes were drilled using a J.K.S. Smit Winkie to find the nature and thickness of till cover. No work was done in 1983.

SPANIEL 1-9 CLAIMS

Petra-Gem Exploration Ltd.	Diamond
200-3540 W. 41st Ave.	106 A/3
Vancouver, B.C.	64°15'N,129°29'W

REFERENCES

Blusson (2905), Oldershaw (1978).

DIAND assessment report 080826.

PROPERTY

SPANIEL 1-9.

LOCATION

SPANIEL 1-9 are about 193 km southwest of Norman Wells, NWT. and 306 km north-northeast of Ross River, YT.

HISTORY

The claims were staked in December 1976 and optioned to C.F. Mineral Research in 1979.

DESCRIPTION

The claims lie on the western flank of the Mackenzie Arch and are underlain by carbonates and shallow-water clastics of Cambrian-Ordovician age. Intruded into this sequence is a chlorite-biotite diatreme.

According to Petra-Gem the diatreme is 610 m in diameter and contains fine to coarse breccia of rounded, altered ultramafic and carbonate fragments in a blue-grey matrix. There is a pyritic halo around the top and sides of the diatreme. Minor chalcopyrite is associated with the pyrite.

Geologists from Petra-Gem describe hand specimens of the diatreme breccia as follows:

> Breccia in the central phase has the appearance, in hand specimen, of an altered volcanic agglomerate. Upon closer examination it is noted that most fragments are rounded and of two types, grey to white carbonate inclusions and dark green to dull green ultramafic fragments. These "autoliths" which are believed to originate in the explosion of immiscible material in the original ultramafic magma, are characterized by the "nuclei" of rounded phlogopite mica books. Weathered surfaces of the breccia appear strongly pitted through erosion of these phlogopites and corrosion of carbonate inclusions. Both matrix and autoliths in the breccia are very strongly altered to clay minerals, chlorite and serpentine. Other minerals identifiable in hand specimen are phenocrysts of augite and opaque oxides, carbonate, pyrite and chalcopyrite. In this section other minerals are pseudomorphs of carbonate after olivine and possibly melilite, chlorite, serpentine, murky equant grains thought to be perovskite, possible ilmenite and minerals of secondary origin, tremolite, quartz, plagioclase, sericite and carbonate. In pan concentrates, other minerals seen were magnetite, chromite (?), barite, zircon and pyrite. Some areas of the breccia appear to be sorted and bedded with fine "sedimentarly" laminae; this is thought to result from fluidization of the material during emplacement of the diatreme.

Petra-Gem concludes that the emplacement of the diatreme was prior to or during the deposition of the Mt. Kindle Group and that the diatreme has many features characteristic of kimberlitic breccia pipes.

CURRENT WORK AND RESULTS

Five samples, each weighing approximately 35 kg, were collected from the diatreme and tested for their microdiamond content.

Four samples did not have any microdiamonds whereas two microdiamonds were identified under the binocular microscope in the residual concentrate from the remaining sample.

PROSPECTING PERMIT 885

G. Ryznar	Lead, Zinc
4405 Glen Canyon Drive	95 J/13
N. Vancouver, B.C. V7N 4B4	63°00'N,123°45'W

REFERENCES

DIAND assessment report 081632.

PROPERTY

Prospecting Permit 885.

LOCATION

The permit is 160 kilometres northwest of Fort Simpson, NWT.

HISTORY

Lead and zinc have been explored for in this area since 1972 by Cominco Ltd., Giant Yellowknife Mines, Aquitaine Canada Ltd. and Union Oil. Cominco Ltd. drilled several lead-zinc showings in 1974 and 1975 and retain claims in the area.

DESCRIPTION

The permit is underlain by a carbonates and minor clastics of rocks from Middle to Upper Devonian age. Fine-grained clastics predominate in the Upper Devonian. The Camsell Thrust is marked by an escarpment striking north-south along the eastern edge of the permit.

Silver, zinc and lead showings were found in the Nahanni Formation as veins, disseminations and infilling breccias.

CURRENT WORK AND RESULTS

The area was prospected and mapped at a scale of 1:4800.

FALCON CLAIM

J. Dodge — Barite
c/o Ross River, Y.T. — 105 P/10
63°44'N,128°55'W

REFERENCES

DIAND assessment report 081677.

PROPERTY

FALCON 1.

LOCATION

The claim is 10 kilometres south-southwest of Godlin Lakes, NWT.

HISTORY

FALCON 1 was staked in 1981.

DESCRIPTION

The claim is underlain by carbonates of the Landry Formation. A barite bed 6 m thick within this formation outcrops for a length of 650 metres.

CURRENT WORK AND RESULTS

Specific gravity determinations were done on 10 grab samples taken from a barite bed.

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CHAPTER 4: ARCTIC ISLANDS REGION

Walter A. Gibbins, District Geologist, Arctic
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INTRODUCTION

The Arctic Islands Region corresponds to the District of Franklin; it includes the Arctic Islands and Melville Peninsula.

The Arctic Archipelago includes all or parts of several major geological provinces. To the south and east it is bound and in part underlain by Precambrian rocks of the Canadian Shield as exposed in the Minto Arch, the Boothia Uplift, and on Melville Peninsula, eastern Devon Island, Ellesmere Island, and most of Baffin Island (Fig. 4-1).

The north-trending Cornwallis Fold Belt, which divides the Arctic Platform and Franklin Geosyncline into eastern and western parts, developed mainly in Silurian and Devonian time in response to periodic faulting caused by movements of the Boothia Uplift. The Sverdrup Basin, which in late Proterozoic and Mesozoic time was superimposed on the folded Franklin Geosyncline, was itself folded in Cenozoic time. Relatively undisturbed Proterozoic sediments occur in several parts of the Arctic Islands, notably Northern Baffin, Victoria, Somerset and Ellesmere Islands. A comprehensive review of the evolution of the Canadian Arctic Islands is given by Kerr (1981).

Commercial production of lead-zinc ore from the Polaris Mine on Little Cornwallis Island commenced in March,1982. It replaced the region's other producing mine, the Nanisivik Mine of northern Baffin Island, as the world's most northerly operating metal mine (see Chapter 2). The larger exploration projects in the Arctic Islands included the search for copper-silver deposits in the Proterozoic Natkusiak Formation basalts of the Shaler Mountains of Victoria Island by Panarctic Oils Ltd. (1982-83), and exploration for base and precious metals in Precambrian gneissic terrain of southeastern Ellesmere Island by Petro-Canada (1983). Petro-Canada also explored coal licences and prospecting permits in west-central Ellesmere Island (1982). In the Borden Rift Zone of northern Baffin Island, Nanisivik Mines Ltd. continued exploration of base-metal targets near their mine and along the Society Cliffs Formation outcrop belt. Petro-Canada explored the adjacent Arctic Bay Formation outcrop belt (1983). In 1982, Borealis Exploration Ltd. drilled and mapped magnetite-iron deposits near Roche Bay, Melville Peninsula. They also undertook metallurgical, geotechnical and environmental studies related to project development. A major part of the 1983 summer work involved airstrip construction.

Several smaller projects involved reconnaissance for kimberlite pipes by Monopros Ltd. and for carvingstone by DIAND's Arctic Islands District Geologist in the Central Arctic and northern Baffin Island. Claim staking was conducted near Hadley Bay (A in Fig. 4-1), Victoria Island, by prospector Bill Reid (copper showings in Glenelg Formation sandstone) and on Kalivik Island near the Polaris mine by Cominco Ltd.

The mineral rights of a large portion of northeastern Ellesmere Island (almost 40,000 sq. km) was removed in June, 1982, by Privy Council order number 1982-1875 as Ellesmere Island National Park Reserve. This includes parts of NTS areas 120 C-F and 340 D, E and H. An assessment of the mineral and hydrocarbon resource potential of this area was recently conducted and published by the Geological Survey of Canada (1981).

Scheduled jet service is available to Resolute Bay, Cambridge Bay, Nanisivik, Frobisher Bay and Hall Beach. Most Arctic settlements have scheduled Twin Otter flights at least once a week. Camp moves and resupply flights for exploration crews are usually by chartered Twin Otters equipped with oversize tires for landing directly on the Arctic tundra. These aircraft are available in Resolute Bay, Frobisher Bay and Hall Beach.

ACKNOWLEDGEMENT

The author gratefully acknowledges continuing aircraft and logistical support provided by the Polar Continental Shelf Project and their staff.

HIGH ARCTIC - INNUITIAN PROVINCE

The Innuitian Tectonic Province contains the record of a Phanerozoic mobile belt in northern Greenland and the Canadian Arctic Archipelago. Two fundamentally different phases in its development are separated by the Devonian-Carboniferous Ellesmerian Orogeny. The first phase involves the early Paleozoic history, while the second is represented by the Carboniferous to Cenozoic history of the province.

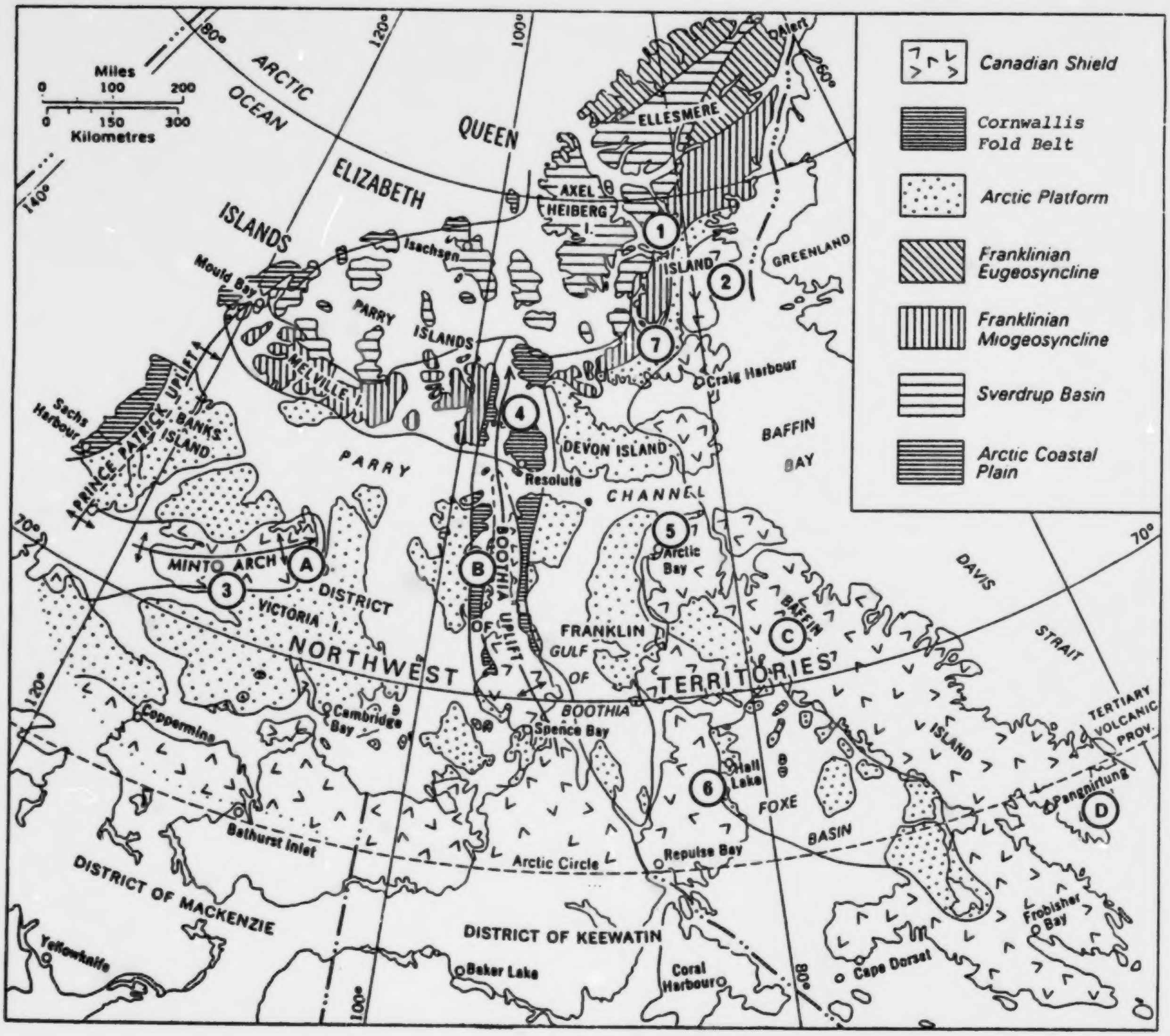
Miles
0 100 200
0 150 300
Kilometres
80°
120°
100°
140°
60°
70°
80°
ARCTIC OCEAN
QUEEN ELIZABETH ISLANDS
ELLESMERE ISLAND
AXEL HEIBERG I.
Alert
GREENLAND
Isachsen
Mould Bay
PARRY ISLANDS
MELVILLE I.
Craig Harbour
Sachs Harbour
PRINCE PATRICK UPLIFT
BANKS ISLAND
DEVON ISLAND
BAFFIN BAY
Resolute
PARRY CHANNEL
MINTO ARCH
VICTORIA I.
DISTRICT OF FRANKLIN
Arctic Bay
BOOTHIA UPLIFT
GULF OF BOOTHIA
DAVIS STRAIT
BAFFIN ISLAND
NORTHWEST TERRITORIES
TERTIARY VOLCANIC PROV.
Coppermine
Cambridge Bay
Spence Bay
Hall Lake
FOXE BASIN
Pangnirtung
Bathurst Inlet
Arctic Circle
Repulse Bay
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
Frobisher Bay
Yellowknife
Baker Lake
Coral Harbour
Cape Dorset
1
2
3
4
5
6
7
A
B
C
D
Canadian Shield
Cornwallis Fold Belt
Arctic Platform
Franklinian Eugeosyncline
Franklinian Miogeosyncline
Sverdrup Basin
Arctic Coastal Plain

FIGURE 4-1: Geological Provinces of the Arctic Archipelago and explanation of projects

ID	*AREA*	*GEOLOGICAL TARGET*	*COMMODITY*	*ORGANIZATION*
1.	*West-central Ellesmere Island*	*Lower Paleozoic strata of the Franklin Miogeosyncline*	*Base metals*	*Petro-Canada Ltd.*
2.	*Southeast Ellesmere Island*	*Precambrian crystalline gneisses*	*Base and precious metals*	*Petro-Canada Ltd.*
3.	*Northwest Victoria Island*	*Proterozoic Natkusiak Formation volcanics*	*Copper, silver*	*Panarctic Oils Ltd.*
4.	*Cornwallis Island*	*Lower Paleozoic carbonates of the Cornwallis Fold Belt*	*Zinc, lead*	*Cominco Ltd.*
5.	*Borden Peninsula, Baffin Island*	*Proterozoic carbonates and shales*	*Zinc, lead*	*Nanisivik Mines Ltd.* *Petro-Canada Ltd.*
6.	*Roche Bay Melville Peninsula*	*Prince Albert Group*	*Iron*	*Borealis Exploration Ltd.*
7.	*Stenkul Fiord, Southern Ellesmere Island*	*Tertiary Eureka Sound Formation - Sverdrup Basin*	*Coal*	*Petro-Canada Ltd.*

A. WILLYS, BANDIT claims (copper, cobalt)
C. Carvingstone - East of Mary River
B. Carvingstone - Flexure Bay and Savage Point
D. Carvingstone - Southern Cumberland Peninsula

Papers by Kerr (1981) and Trettin and Balkwill (1979) are recommended for a more detailed description of the geological history of the area.

PROSPECTING PERMITS 846 TO 884

WEST-CENTRAL ELLESMERE ISLAND RECONNAISSANCE

Petro-Canada	Base metals
P.O. Box 2844,	49C-F,H
Calgary, Alta. T2P 3E3	77°30'-79°45'N,
	77°00'-85°30'W

REFERENCES

Fortier and others (1963); Gibbins (1984); Gibbins and others (1977); Kerr (1967, 1968, 1976, 1977a, b); Kerr and Thorsteinsson (1972); Morganti (1981); Sangster (1981); Thorsteinsson (1972a-e); Thorsteinsson and Tozer (1970); Trettin (1978, 1979); Trettin and Balkwill (1979).

DIAND assessment report 081649.

PROPERTY

Thirty-nine prospecting permits (846-884) totaling 247,852 ha. (49 C/9,16, D/12,13, E/4-6,12,14, F/1,2,7-3, H/3,4,9).

LOCATION

The west-central Ellesmere Island mineral reconnaissance was conducted from a base camp at Strathcona Fiord (78°33'N, 81°57'W), about 30 km east of the centre of the project area (Figs. 4-1 (no. 1) and 4-2) and 500 km northeast of Resolute Bay, Cornwallis Island. This camp was shared with geologists from the Petro-Canada coal group, (see pages 135-150). The project area is extremely large; approximately 12,250 km^2 of permitted and open ground in a 100 by 250 km area were explored.

The area lies within the Innuitian Province and includes parts of several physiographic regions (Fig. 4-3).

HISTORY

Southwestern Ellesmere Island was mapped at reconnaissance scale by the Geological Survey of Canada in 1955 as part of Operation Franklin (Fortier and others, 1963). The area was mapped in more detail in the early 1960's and 1:250,000 scale maps are available for all of the area except 49D - Vendom Fiord (Thorsteinsson, 1972a-d; Kerr and Thorsteinsson, 1972).

In the early 1970's Trettin measured several sections of lower Paleozoic strata in the area to integrate the stratigraphy and depositional history of the "eugeosynclinal" terrains of northern Ellesmere Island (Hazen Trough) with "miogeosynclinal" terrains of central Ellesmere Island (Trettin,1978, 1979).

Cominco Ltd., Cordilleran Engineering Ltd. (on behalf of Kapvik Exploration Ltd.) and Great Plains Development Ltd. (now Norcen Energy Ltd.) did regional exploration of the Franklin Miogeosyncline of western and central Ellesmere Island in 1974 (Gibbins and others, 1977, p. 60-64). Great Plains Development Ltd. discovered and staked several lead-zinc showings in carbonates of the Ordovician Copes Bay Formation of Judge Daly Promontory.

In 1981, Petro-Canada geologists studied the mineral potential of northwestern Ellesmere Island from camps at Tanquary Fiord and Eureka. An economically unimportant copper occurrence on Hare Fiord was found to be restricted to a thin interval of Cambrian Grant Lake Formation cherts (Gibbins, 1984, p. 110-111). A geochemical survey produced a number of anomalies, the most significant of which were zinc anomalies from rock samples of the Cape Phillips Formation (Ordovician-Devonian) shale. It was concluded that this strata has a potential as a host of economic quantities of lead and zinc. The Grant Land and Hazen Formations (Cambrian-Silurian) contained copper and zinc geochemical anomalies, respectively.

It was recommended that further investigation of these strata be conducted in 1982. It was also suggested that the Allen Bay Formation, the facies equivalent of the Cape Phillips Formation, be assessed for possible carbonate-hosted lead-zinc deposits and that the study be restricted to areas in which deposits could ultimately be exploited if found.

The 39 prospecting permits were obtained by 103912 Canada Inc. (a subsidiary of Petro-Canada) at the end of January, 1982; they were relinquished at the end of January, 1983.

DESCRIPTION

The project area includes a large section of the Central Ellesmere Fold Belt (southeastern Franklin Miogeosyncline) and a strip of the adjacent stable shelf (Arctic Platform) along its eastern margin (Fig. 4-4) (Trettin, 1978 and Trettin and Balkwell, 1979). The Composite stratigraphic section of the southeastern Franklin Geosyncline is presented in Table 4-1 from Kerr (1967, 1968 and 1976). To the northwest a thick section of clastic sediments of the

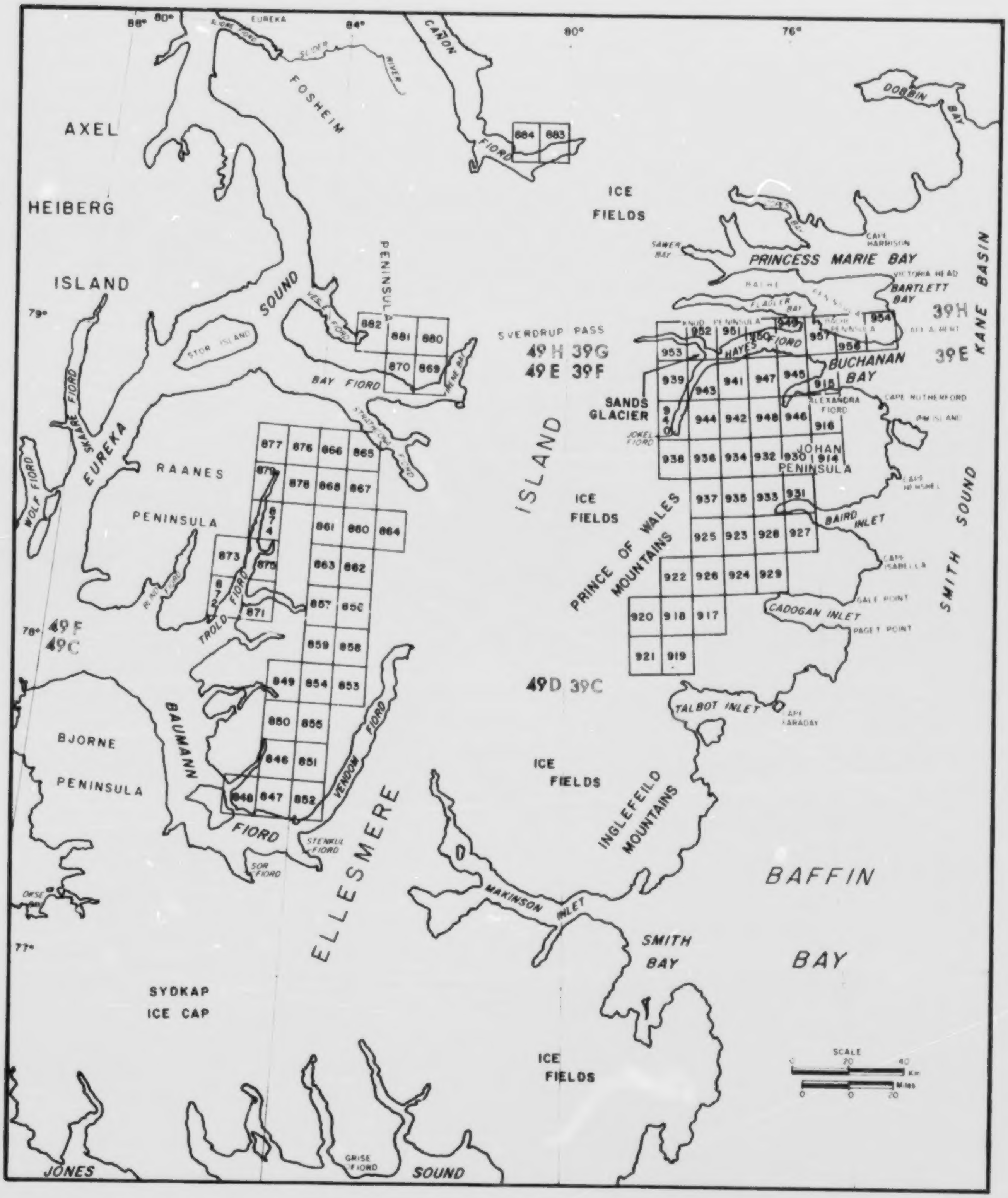
88°
86°
EUREKA
SLIDRE FIORD
SLIDRE RIVER
84°
CAÑON FIORD
80°
76°
FOSHEIM
PENINSULA
AXEL
HEIBERG
ISLAND
DOBBIN BAY
ICE FIELDS
884
883
SAWYER BAY
CAPE HARRISON
PRINCESS MARIE BAY
VICTORIA HEAD
BARTLETT BAY
KANE BASIN
39H
39E
BACHE PENINSULA
FLAGLER BAY
KNUD PENINSULA
HAYES FIORD
BUCHANAN BAY
ALEXANDRA FIORD
CAPE RUTHERFORD
PIM ISLAND
JOHAN PENINSULA
CAPE NORMAN
BAIRD INLET
CAPE ISABELLA
SMITH SOUND
GALE POINT
CADOGAN INLET
PAGET POINT
TALBOT INLET
CAPE FARADAY
79°
SOUND
STOR ISLAND
VESLE FIORD
882
881
880
870
869
BAY FIORD
IRENE BAY
SVERDRUP PASS
49H 39G
49E 39F
SANDS GLACIER
JOKEL FIORD
ISLAND
STRATHCONA FIORD
SKAARE FIORD
EUREKA
WOLF FIORD
RAANES
PENINSULA
877 876 866 865
879 878 868 867
874
861 860 864
873 875
863 862
872
871
857 856
859 858
849 854 853
850 855
846 851
848 847 852
TROLD FIORD
78°
49F
49C
ICE FIELDS
PRINCE OF WALES MOUNTAINS
953 952 951 949 957 954
950 956
939 943 941 947 945 915
940 944 942 948 946 916
938 936 934 932 930 914
937 935 933 931
925 923 928 927
922 926 924 929
920 918 917
921 919
49D 39C
BAUMANN FIORD
VENDOM FIORD
BJORNE
PENINSULA
STENKUL FIORD
SOR FIORD
ELLESMERE
ICE FIELDS
INGLEFEILD MOUNTAINS
BAFFIN
BAY
MAKINSON INLET
SMITH BAY
77°
SYDKAP
ICE CAP
ICE FIELDS
SCALE
0 20 40 Km
0 0 20 Miles
JONES
GRISE FIORD
SOUND

FIGURE 4-2: Petro-Canada prospecting permits Ellesmere Island: 846-884 are 1982 work and 914-956 are 1982-83 work

Imina, Eids and Red Canyon River Formations are interpreted as 'flysch, transitional and molasse phases of a clastic wedge of northerly provenance' (Trettin, 1978, p. 1 and Fig. 4-5).

Paleozoic Franklin Miogeosyncline:

The Franklinian Geosyncline was a site of pronounced subsidence and is divisible into three paleogeographic belts that shifted with time. These are: (1) a southeastern shelf, margin and slope and (2) the central Hazen Trough, that form the miogeosyncline, part of the geosyncline, and (3) a complex northwestern belt that was the site of coastal plain, shelf, and volcanic island arc environments (the eugeosyncline). The Pearya Geanticline is the inferred source area for the clastic sediments of the northwestern coastal plain and the bulk of the clastic sediments in the Hazen Trough (Fig. 4-5).

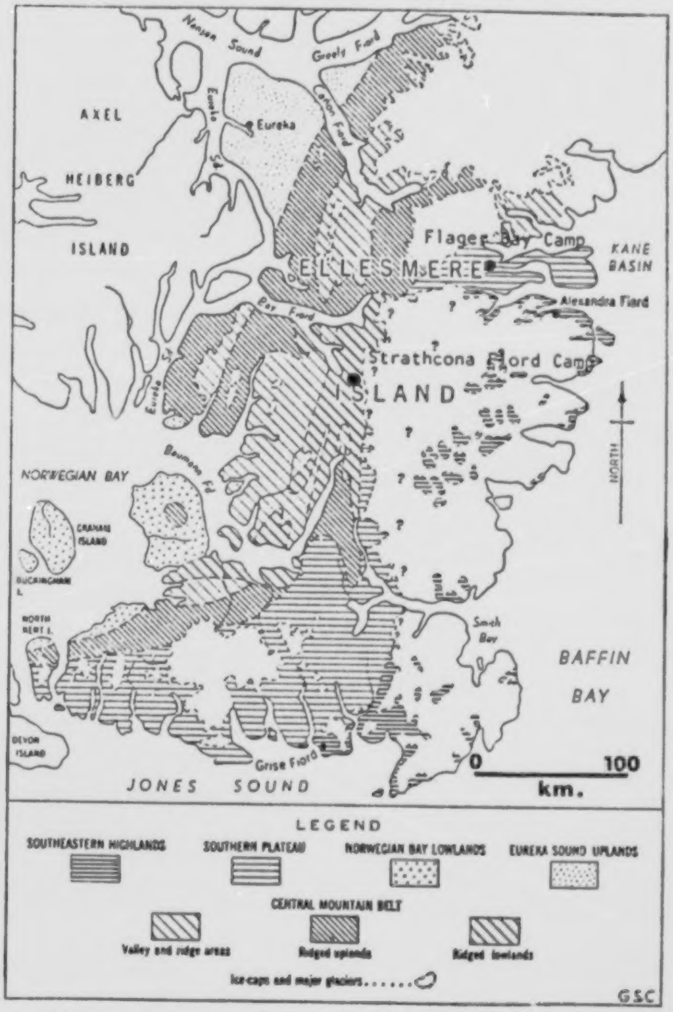
Nansen Sound
Greely Fiord
AXEL
HEIBERG
ISLAND
Eureka
Eureka Sound
Canon Fiord
Flager Bay Camp
KANE BASIN
ELLESMERE
ISLAND
Bay Fiord
Alexandra Fiord
Strathcona Fiord Camp
Beaumont Fd
NORTH
NORWEGIAN BAY
GRAHAM ISLAND
BUCKINGHAM I.
NORTH KENT I.
Smith Bay
BAFFIN BAY
DEVON ISLAND
Grise Fiord
JONES SOUND
0
100
km.
LEGEND
SOUTHEASTERN HIGHLANDS
SOUTHERN PLATEAU
NORWEGIAN BAY LOWLANDS
EUREKA SOUND UPLANDS
CENTRAL MOUNTAIN BELT
Valley and ridge areas
Ridged uplands
Ridged lowlands
Ice-caps and major glaciers......
GSC

FIGURE 4-3: Physiographic divisions of southern Ellesmere Island (from Roots in Fortier and others, 1963)

On northern Ellesmere Island, early Cambrian to Devonian sediments were deposited in the Hazen Trough and its adjacent slope and shelf areas. Two diachronous depositional phases are distinguished: an early Cambrian to late Silurian pre-flysch phase and a Silurian to early Devonian flysch phase (Trettin, 1978). Strata include the dominantly clastic Grant Land, Hazen and Imina formations (Trettin and Balkwill, 1979).

South of the trough is a belt of Lower to Middle Paleozoic strata that is appoximately 13,000 metres thick. This consists of a lower succession of Cambrian clastics (Ellesmere Group) and succeeding carbonates. Overlying carbonates include the Cambrian Scoresby Bay and Parrish Glacier Formations and the Lower Ordovician Copes Bay Formation. These are equivalent to strata of similar age on the stable platform to the east (Thorsteinsson and Tozer, 1970).

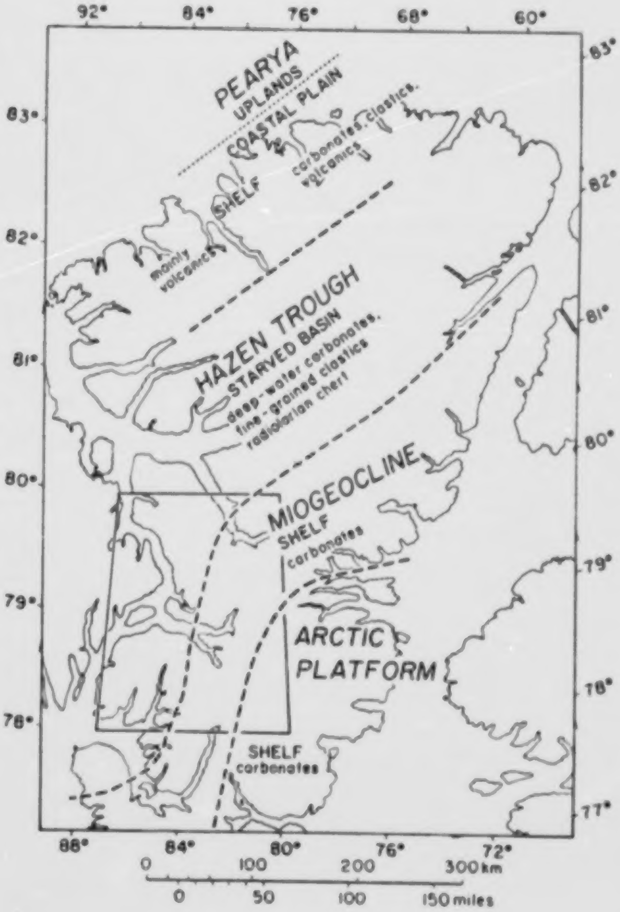
92°
84°
76°
68°
60°
83°
82°
81°
80°
79°
78°
77°
PEARYA
UPLANDS
COASTAL PLAIN
carbonates, clastics,
volcanics
SHELF
mainly volcanics
HAZEN TROUGH
STARVED BASIN
deep-water carbonates,
fine-grained clastics
radiolarian chert
MIOGEOCLINE
SHELF
carbonates
ARCTIC PLATFORM
SHELF
carbonates
88°
84°
80°
76°
72°
0
100
200
300 km
0
50
100
150 miles

FIGURE 4-4: Depositional framework of northern and central Ellesmere Island during late Ordovician (early Ashgillian) times (from Trettin, 1978)

TABLE 4-1: TABLE OF FORMATIONS, CENTRAL ELLESMERE FOLD BELT (from Kerr, 1967, 1968 and 1976)

PERIOD	EPOCH	FRANKLINIAN MIOGEOSYNCLINE								
		NORTHWESTERN DIVISION (composite)			CENTRAL DIVISION (composite)			SOUTHEASTERN DIVISION (composite)		
		Formation or Group	Lithology	Thickness in Feet (metres)	Formation or Group	Lithology	Thickness in Feet (metres)	Formation or Group	Lithology	Thickness in Feet (metres)
DEVONIAN	Upper				Okse Bay	Sandstone, quartzose, some siltstone, non-calcareous, varicoloured	Up to 6100 (1870) preserved	Okse Bay	Sandstone, quartzose, some siltstone, non-calcareous, varicoloured	Up to 6130 (1870) preserved
	Middle	Eids ?	Laminated calcareous mudstone, minor sandstone and siltstone (mudstone unit of Trettin, 1973)	Up to 6000 (1829) preserved	Blue Fiord	Limestone, shaly, commonly reefal	0-3600 (0-1100)	Bird Fiord	Limestone, dolomite, sandy and shaly	0-1410 (0-431)
								Blue Fiord	Dolomite, thick bedded; minor limestone and quartz sandstone	145-2430 (44-741)
	Lower	?	?	?	Eids, Vendom Fiord, Imina and unnamed Formations	Clastic units including calcareous mudstone, sandy and silty turbidites and red and green siltstone; minor carbonates	2000-2680 (610-814+)	Vendom Fiord	Red quartz and carbonate sandstone	0-1200 (0-366)
								Eids and unnamed Formations	Calcareous mudstone, red and green siltstone	0-1030+ (0-314+)
SILURIAN	Pridolian	Imina	Flysch-like succession of calcareous and dolomitic sandstone, siltstone and shale, minor conglomerate and carbonate breccia	2670-9000 (814-2743)	Cape Phillips	Cape Phillips - shale, shaly limestone, limy siltstone, graptolitic	0-2200 (0-671)	Cape Phillips	Cape Phillips - shale, shaly limestone, limy siltstone, graptolitic	0-1320+ (0-404+)
	Ludlovian									
	Wenlockian	Cape Phillips and Hazen Formations	Shale, shaly limestone, limestone, chert, graptolitic; includes carbonate-chert-shale facies of Trettin (1973)	0-3100 (0-945)	Allen Bay-Read Bay, undivided	An undivided succession, lower part mainly dolomite, upper part mainly limestone, commonly with dolomite, shaly limestone, sandstone and in places reef breccia	0-9480? (0-2890?)	Allen Bay-Read Bay, undivided	An undivided succession, lower part mainly dolomite, upper part mainly limestone, commonly with dolomite, sandstone and shale	880-6325 (268-1928)
	Llandoverian									
ORDOVICIAN	UPPER CINCINNATIAN	Irene Bay (?)	Limestone, dark grey, shaly interbeds, fossils rare	675+ (206+)	Irene Bay	Limestone, shaly, medium grey, weathers greenish, recessive, fossils common	140-1080 (43-330)	Irene Bay	Limestone, shaly, medium grey, weathers greenish	180-270 (57-82)
		CORNWALLIS GROUP: Thumb Mountain	*Limestone dark grey bluff forming.*	?–1800	CORNWALLIS GROUP: Thumb Mountain	*Limestone, partly dolomite, dark grey brown, thick bedded, slightly rusty weathers medium grey, bluff forming*	850–2300	CORNWALLIS GROUP: Thumb Mountain	*Limestone, partly dolomite, dark grey brown, thick bedded, slightly rusty weathers medium grey, bluff forming*	1100–1650
	MIDDLE MOHAWKIAN	CORNWALLIS GROUP: Bay Fiord	*Limestone shaly and sandy dark grey to light grey recessive*	1450–2000 +	CORNWALLIS GROUP: Bay Fiord	*Limestone, silty and sandy and shaly, dolomite in southern sections, anhydrite common, recessive*	780–1800	CORNWALLIS GROUP: Bay Fiord	*Limestone, thin bedded, silty, sandy and shaly, lower part commonly anhydritic, recessive*	900–1700
	LOWER	Eleanor River	*Limestone, shaly and silty thick bedded, bluff forming*	?–775	Eleanor River	*Limestone, medium grey, buff weathering, thick bedded, bluff forming*	775–2000 +	Eleanor River	*Limestone, medium grey, buff weathering, thick bedded, resistant bluff*	700–2600
		Disconformity [illegible]	?		Baumann Fiord	C *gypsum anhydrite, white* B *limestone, resistant* A *gypsum anhydrite, white*	0–2560	Baumann Fiord	C *gypsum anhydrite, white* B *limestone, resistant* A *gypsum anhydrite, white*	100–970
		Copes Bay	*Limestone shaly and sandy sandy dolomite, no gypsum*	2825	Copes Bay	*Limestone shaly and silty, minor gypsum, flat pebble conglomerate, mud cracks, ripple marks*	2350 +	Copes Bay	*Limestone, silty and shaly often dolomitic, flat pebble conglomerate common*	1800–4800
CAMBRIAN	UPPER				Disconformity [illegible]					
	MIDDLE	Parrish Glacier	limestone, dolomite, quartz sandy and silty, varicoloured	2125	Parrish Glacier	in north, limestone and dolomite, very sandy, varicoloured; in south sandstone, quartzose, minor limestone	1500+	Parrish Glacier	limestone, shale siltstone, fine grained sandstone, thin-bedded, varicoloured	870-1510
	LOWER	Scoresby Bay	dolomite, medium to dark grey, limestone interbeds, shaly, basal coarse boulder conglomerate	2020	Scoresby Bay	dolomite, limestone and shale interbeds, medium to dark grey	2510	Scoresby Bay	dolomite, light to dark grey, resistant	660-1800
		Ellesmere Group: Kane Basin	phyllite, minor slate, black, weathers rusty brown	1300+	Ellesmere Group: Kane Basin	siltstone, sandstone, shaly, thin-bedded	820	Ellesmere Group: Kane Basin	sandstone, fine-grained, shaly, minor dolomite, thin-bedded	375-820
		Ellesmere Group: Rawlings Bay	sandstone, quartzose, shaly, minor phyllite	2223	Ellesmere Group: Rawlings Bay	sandstone, quartzose, micaceous, shaly in places, thick-bedded	1790	Ellesmere Group: Rawlings Bay	sandstone, quartzose, pebbly sandstone conglomerate, varicoloured	820-3121
		Ellesmere Group: Ritter Bay	phyllite, slate, dark grey, minor quartz sandstone	1100+	Ellesmere Group: Ritter Bay	phyllite, minor slate, dark grey to black, white bloom on weathering	1400			
					Ellesmere Group: Archer Fiord	quartz sandstone, pebbly sandstone	300			

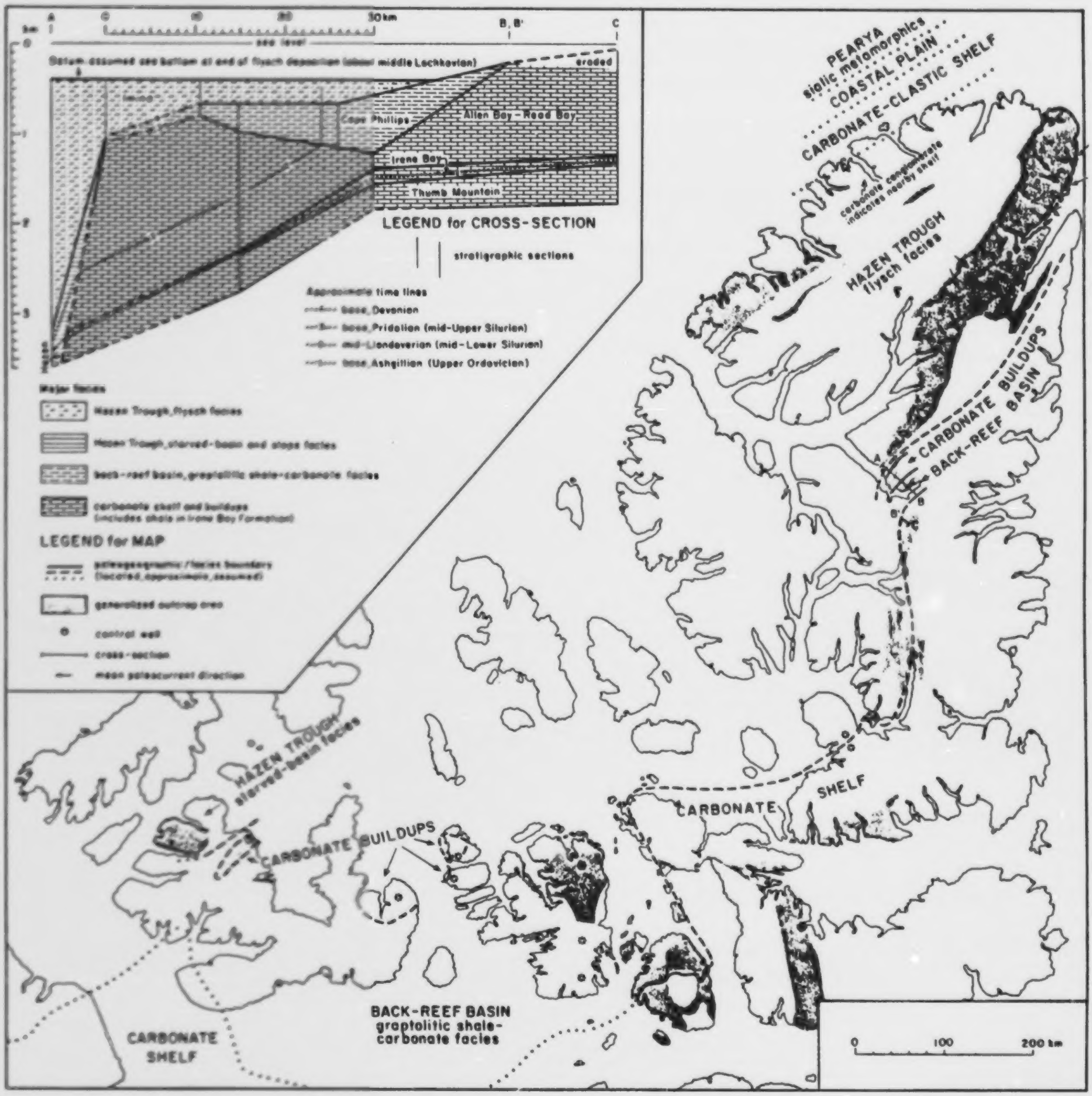
A
0
10
20
30km
B, B'
C
km
0
1
2
3
sea level
Datum assumed sea bottom at end of flysch deposition (about middle Lochkovian)
eroded
Imina
Cape Phillips
Allen Bay - Read Bay
Irene Bay
Thumb Mountain
LEGEND for CROSS-SECTION
stratigraphic sections
Approximate time lines
base Devonian
base Pridolian (mid-Upper Silurian)
mid-Llandoverian (mid-Lower Silurian)
base Ashgillian (Upper Ordovician)
Major facies
Hazen Trough, flysch facies
Hazen Trough, starved-basin and slope facies
back-reef basin, graptolitic shale-carbonate facies
carbonate shelf and buildups (includes shale in Irene Bay Formation)
LEGEND for MAP
paleogeographic / facies boundary (located, approximate, assumed)
generalized outcrop area
control well
cross-section
mean paleocurrent direction
PEARYA
sialic metamorphics
COASTAL PLAIN
CARBONATE-CLASTIC SHELF
carbonate conglomerate indicates nearby shelf
HAZEN TROUGH
flysch facies
CARBONATE BUILDUPS
BACK-REEF BASIN
HAZEN TROUGH
starved-basin facies
CARBONATE BUILDUPS
CARBONATE
SHELF
BACK-REEF BASIN
graptolitic shale-carbonate facies
CARBONATE
SHELF
0
100
200 km

FIGURE 4-5: Facies relationships and paleogeography during the middle Silurian (from Trettin and Balkwill, 1979)

Overlying this lower succession are Ordovician evaporites (Baumann Fiord, Bay Fiord Formations) and carbonates (i.e. the Cornwallis Group). This is followed by an Upper Ordovician to Upper Devonian sequence (Fig. 4-5) of marginal carbonates (Allen Bay-Read Bay Group, and the Blue Fiord-Bird Fiord Formations) and their basinal facies equivalents (Cape Phillips Formation shales and Eids Formation flysch) (Thorsteinsson and Tozer, 1970).

The dominantly carbonate Ordovician to Devonian succession grades stratigraphically upward, as well as northwesterly and westerly, into dominantly molasse-type clastic rocks (Fig. 4-5 and Table 4-1) of the Bird Fiord Formation, Melville Island (in western Arctic) and Okse Bay Formation (in eastern Arctic) (Thorsteinsson and Tozer, 1970).

Paleozoic Franklinian Eugeosyncline:

Franklinian eugeosynclinal rocks are found along the northwest coast of Ellesmere Island and consist of Middle Ordovician or older carbonate-chert-keratophyre assemblages. Overlying this is a Middle Ordovician to Late Silurian sequence of chert-pebble

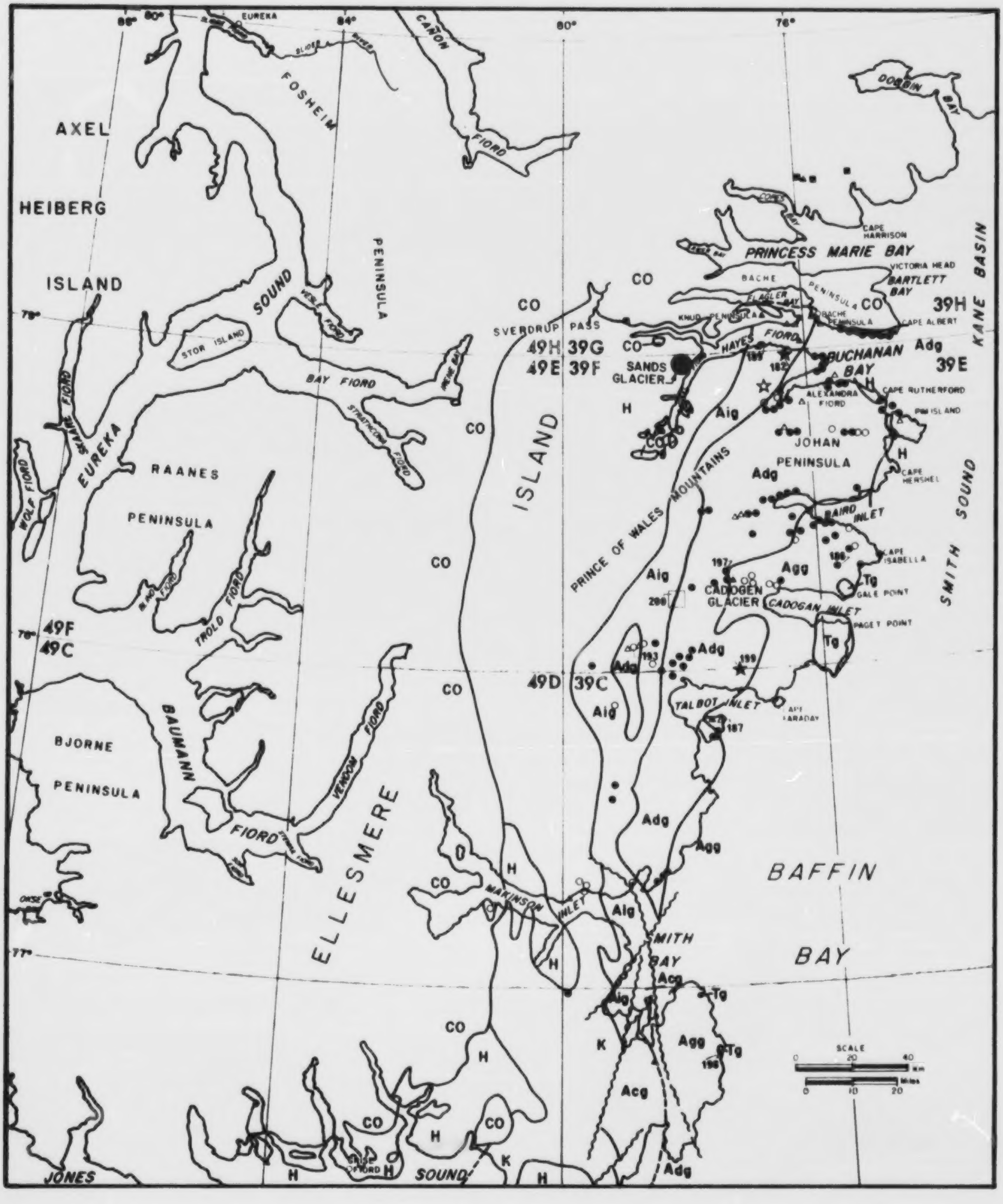
AXEL
HEIBERG
ISLAND
EUREKA
FOSHEIM
PENINSULA
CAÑON
FIORD
SOUND
STOR ISLAND
BAY FIORD
EUREKA
RAANES
PENINSULA
WOLF FIORD
TROLD FIORD
BJORNE
PENINSULA
BAUMANN
FIORD
VENDOM FIORD
ELLESMERE
ISLAND
SVERDRUP PASS
49H 39G
49E 39F
49F
49C
49D 39C
39H
39E
SANDS
GLACIER
PRINCESS MARIE BAY
DOBBIN BAY
CAPE HARRISON
VICTORIA HEAD
BARTLETT BAY
BACHE
PENINSULA
KNUD PENINSULA
FLAGLER BAY
HAYES FIORD
BUCHANAN BAY
CAPE ALBERT
ALEXANDRA FIORD
CAPE RUTHERFORD
PIM ISLAND
JOHAN
PENINSULA
CAPE HERSHEL
BAIRD INLET
CAPE ISABELLA
GALE POINT
PRINCE OF WALES MOUNTAINS
CADOGEN
GLACIER
CADOGAN INLET
PAGET POINT
TALBOT INLET
CAPE FARADAY
KANE BASIN
SMITH SOUND
BAFFIN
BAY
MAKINSON INLET
SMITH
BAY
JONES
SOUND
CO
H
Aig
Adg
Agg
Acg
Tg
K
182
189
190
193
197
199
200
187
88°
86°
84°
80°
76°
79°
78°
77°
SCALE
0
20
40
Km
0
10
20
Miles

FIGURE 4-6: Geology eastern Ellesmere Island (from DIAND assessment report 081743)

LEGEND

CAMBRIAN/ORDOVICIAN			
	CO	Cambro-Ordovician Formations	dolomite, limestone, shale
		unconformity	
NEOHELIKIAN			
	Tg	Thule Group	sandstone, siltstone, basalt, stromatolitic dolomite
		non-conformity	
APHEBIAN?			
	H	Post-Archean Plutonic Rocks	granite, granodiorite, tonalite, migmatite
		intrusive contact	
ARCHEAN?			
	A	Alexandra Supergroup	
	Agg	Glentworth Group	psammo-pelitic gneiss, pelitic gneiss, minor marble (molasse facies)
	Adg	Digarmulen Group	mafic metavolcanic, tonalite, pelitic gneiss, sulphide-facies iron formation (eugeosynclinal facies)
	Acg	Cobourg Island Group	quartzite, psammo-pelitic gneiss, minor marble (platform facies)
	Aig	Inglefield Group	calcitic marble, psammo-pelitic gneiss, pelitic gneiss (miogeosynclinal facies)
		fault or anatectic contact	
	K	Devon Island Gneiss Complex	augen gneiss, orthogneiss, orthopyroxene gneiss, migmatite

MINERAL OCCURRENCES

Iron sulphides	●	Sulphide-facies iron formation
	○	Contact metasomatic iron sulphides
Copper occurrences	△	Malachite stain
	▲	Disseminated chalcopyrite
	●	Disseminated chalcopyrite and molybdenite
Skarns	☆	Scheelite skarn
	★	Arsenide skarn
Vein mineralization	⬤	Copper, nickel, cobalt and iron sulphides with gold and silver
Barium occurrence	□	Barite, barito-calcite, calcite.

conglomerates, laminated felsic flows and tuffs, limestone and dolomite (Cape Discovery Formation) and volcanic flows, breccias and tuffs (M'Clintock Formation). Younger strata include shales, siltstones and sandstones. Near the top of the sequence are the calcareous sandstones, siltstones and shales of the Imina Formation.

Metamorphism and structural deformation are variable, both being most intense along the western edge of the eugeosyncline. The area may have been affected by orogeny and uplift prior to the Middle Devonian, as well as by the Ellesmerian Orogeny.

Sverdrup Basin:

The Sverdrup Basin is a successor basin superimposed on the Franklin Geosyncline. It contains an essentially concordant succession up to 13,000 m thick of Lower Carboniferous to Tertiary, marine and nonmarine sedimentary rocks, basalt flows and gabbro dikes and sills. Strata of the Sverdrup Basin were folded and faulted during the Cenozoic Eurekan Orogeny along trends that are approximately aligned with older structures. In addition to deformation, piercement bodies of Carboniferous evaporites were emplaced in parts of the Sverdrup Basin.

Structure:

The main deformation events of the Innuitian Tectonic Province are as follows:

1) Precambrian Orogeny: Basement strata once

considered part of the Franklinian Geosynline are now interpreted as deposits of a Helikian to early Hadrynian shelf-basin, some of which show evidence of involvement in a Grenville-age orogeny (Trettin and Balkwill, 1979).

2) Middle Ordovician deformation: Near M'Clintock Inlet, northwestern Ellesmere Island, a Middle Ordovician deformation is indicated by an angular unconformity beneath the Cape Discovery Formation.
3) Caledonian-age orogeny: The Caledonian Orogeny of Greenland coincides approximately with three south-trending arches: an area in east-central Ellesmere Island, the Boothia Uplift and the Rens Fiord Uplift. These were elevated during the early Devonian, or late Silurian and early Devonian. In the first belt, clastics, including many red-beds (i.e., Vendom Fiord Formation) were unconformably deposited over older sediments (Trettin and Balkwill, 1979).
4) Ellesmerian Orogeny: This was the most extensive and intensive deformation and it progressed from north to south producing three fold belts (Fig. 1 of Trettin and Balkwill, 1979).
    i) The Northern Ellesmere Fold Complex began by the Middle Devonian and was completed before late Early Pennsylvanian.
    ii) The Hazen Fold Belt includes the deformed strata on the northeastern part of the Hazen Trough (Fig. 4-4).
    iii) Central Ellesmere Fold Belt - The deformation of the Central Ellesmere Fold Belt, which includes the project area, probably began after the deposition of the 'clastic wedge' in latest Devonian or earliest Carboniferous time and continued until Early Pennsylvanian time. The deformation was of skin type and characterized by extensive concentric folds controlled by competent carbonate units. The main decollement must occur in Proterozoic strata close to the crystalline basement, but is not exposed. Crustal shortening is less than in the Hazen Fold Belt (Trettin and Balkwill, 1979, p. 759).
5) Melvillian Disturbance: This early Permian phase is marked by folding in northwestern Melville Island and faulting in the Trold Fiord region of Ellesmere Island.
6) Eurekan Orogeny: The latest Cretaceous to middle Tertiary deformation was most intense in Axel Heiberg and Ellesmere Islands. Faulting predominated, with large vertical displacements occurring in conjunction with thrust and normal faulting and broad arching. Horizontal displacement is minor. In central Ellesmere Island thrust faults, commonly en echelon, generally strike northeast, dip northwest and extend for more than 160 kilometres. The early extensional phase of the Eurekan Orogeny is marked by continental tholeiite flows in Late Cretaceous strata on northern Ellesmere and by dike swarms throughout Sverdrup Basin.

CURRENT WORK AND RESULTS

Objectives:

The principal objective of the 1982 program was to locate and assess exploitable occurrences of economic minerals. Lead and zinc were main targets as the region has potential for both shale-hosted (sedex) and carbonate-hosted (Mississippi Valley-type) deposits. Sangster (1981) suggested that slow sedimentation rates, euxinic conditions and possible synsedimentary faulting in the Cape Phillips Formation of the region, make it a potential host of lead-zinc minerals.

Both Howard's Pass (low silver, copper, barite and iron and low temperature) and MacMillan Pass (metal zoning, stockwork zone, etc.) types of shale-hosted lead-zinc deposits (Morganti, 1981) were sought. Mississippi Valley-type deposits were explored for on both sides of the Cape Phillips Formation shale - Allen Bay and Read Bay Formation carbonate facies front, which trends northerly through the project area and the Cornwallis Lead-Zinc District to the southwest (Kerr, 1977b), and in Devonian biostromal platform carbonates which host the ore deposits of the Pine Point Lead-Zinc District. Red-bed clastic rocks were prospected for copper and uranium.

Geochemistry:

Several hundred silt samples, mainly stream-sediments, were collected in conjunction with reconnaissance mapping and prospecting, while detailed rock and soil sampling was done in areas of mineral showings and gossans. Threshold and anomalous limit levels were determined for each element and major rock type (Table 4-2). Eighteen samples were anomalous in two or more elements. Single element

TABLE 4-2: THRESHOLD AND ANOMALOUS GEOCHEMICAL MEASUREMENTS OF SILT SAMPLES, WEST-CENTRAL ELLESMERE ISLAND

	Shale Group		Carbonate Group	
Element	Threshold	Definitely Anomalous Limit	Threshold	Definitely Anomalous Limit
Copper	64	87	40	70
Lead	21	27	22	74
Zinc	250	500	80	180

anomalies included 44 zinc, 13 lead and 4 copper assays. In general, the zinc and copper-zinc anomalies are related to hydrozincite showings in shales of the Devon Island Formation and Cape Phillips Formation. The anomalous lead and lead-zinc samples were collected downstream from low-grade galena and smithsonite showings in carbonates of the Thumb Mountain Formation and Allen Bay Formation, mainly in the eastern margin of the project area and the Central Ellesmere Fold Belt. However, numerous showings in the Irene Bay and Mount James area did not produce anomalous stream sediments.

Chip samples and grab samples of hydrozincite-bearing shales contained 0.02-0.5% Zn, less than 0.01% Cu, 1.8% Ba and 2.6 ppm Ag. The results of the geochemical work were not encouraging and only a few weakly anomalous samples are unexplained.

Heavy Minerals:

Fifty-seven reconnaissance and nine orientation samples were collected for heavy mineral analysis. One sample (HM 37), collected on the west side of Trold Fiord, contained anomalous lead and zinc. It was interpreted as having a nearby source, but this source could not be found.

Three samples, one from the north end of Makinson Inlet (HM 64) and two from Eids Fiord and Baumann Fiord (HM 90, HM 96), contain kimberlite indicator minerals; ilmenite, chromite, and/or chrome diopside.

Prospecting and Geological Mapping:

The mapping emphasised the recognition and definition of sedimentary, stratigraphic and tectonics commonly associated with important shale and carbonate-hosted lead-zinc deposits. Criteria included basin-shelf hinge-lines, shale-carbonate facies changes, unconformities, euxinic shales, reefal, brecciated and dolomitized carbonates, clastic red-bed horizons, major structural elements and so on.

Although the project failed to locate any potentially economic mineralization, 130 lead, zinc, barite, and pyrite occurrences were discovered. These included 87 formational and fracture-related hydrozincite showings in shale of the Cape Phillips and Devon Island Formations, 16 showings of Mississippi Valley-type disseminated galena, sphalerite and barite in Allen Bay Formation dolomite, 14 showings of fault- and vein-related galena, sphalerite and barite, and nine barite localities (8 nodular and 1 bedded) in the Devon Island Formation.

Prospecting showed that hydrozincite showings in Devon Island Formation strata are most abundant in the Vendom Fiord-Baumann Fiord areas. Hydrozincite occurs close to nodular barite in the lower part of the formation. Barite occurs at 80 and 300 metres above the base of the Devon Island Formation. It is common west of Mount Low, southeastern Fosheim Peninsula, and near the head of Troll Bay, southern Svendsen Peninsula.

Hydrozincite in the Cape Phillips Formation is most abundant in the spiralis graptolite zone within the medial to upper part of the unit. It is best developed in the thickest sections of this zone in flaggy to platy mudstone and calcareous mudstone near the north end of Trold Fiord.

Eight showings of galena, sphalerite and barite are present as disseminations, fracture fillings and veinlets in a brecciated and cemented facies of the uppermost Allen Bay Formation dolomite west of Irene Bay. Weathered galena has a black coating that can be mistaken for lichen, and honey-brown sphalerite weathers to white or pale brown smithsonite. A grab sample of the best material assayed 5.37% Pb, 1.44% $BaSO_4$; the highest zinc assay was 1.96% Zn with 12.3 ppm Ag. Barite occurs with calcite veinlets in these rocks.

Fault-related galena, sphalerite and barite-bearing veins are found in Thumb Mountain Formation and Allen Bay Formation - Read Bay Formation carbonates of two areas. In the Mount James area (79°12'N, 83°W), sulphides are found in some of the calcite-filled gash veins and associated with numerous crackle veinlets close to a large northeast-trending dip-slip fault that cuts Allen Bay Formation strata in the south and Thumb Mountain Formation strata in the north. The second area is west of Vendom Fiord where sulphides and barite occur in an area of intense block faulting and carbonate veining within undivided Thumb Mountain Formation and Allen Bay Formation limestones. The best material assayed 11.8% Zn (smithsonite) and 5.14% Pb (galena) found in a one metre square area.

Three small pyrite showings were found in the basal beds of the Tertiary Eureka Sound Formation on the Fosheim Peninsula south of Canon Fiord. Traces of malachite, associated with tetrahedrite, were found in an irregular quartz carbonate vein cutting argillaceous limestones of the upper Hazen Formation in the Caledonian Bay area on the north shore of Canon Fiord, mapped by Trettin (1979).

All of the west central Ellesmere Island prospecting permits were relinquished in January, 1983.

PROSPECTING PERMITS 914-956 AND EASTERN ELLESMERE, COBURG AND EASTERN DEVON ISLANDS RECONNAISSANCE

Petro-Canada	Base metals, precious metals, tungsten, barite
P.O. Box 2844	29 G, 38 F, G, 39 B-H, 48 E, H
Calgary, Alberta, T2P 3E3	74°30'-80°00'N, 74°00'-86°00'W

REFERENCES

Christie (1962a, b, 1967, and 1978); Dawes and others (1982); Frisch (1983); Frisch and Christie (1982); Frisch and Dawes (1982); Frisch and others (1978); Kerr (1972a, b); Krupicka (1973).

DIAND assessment report 081743.

PROPERTY

Forty-three prospecting permits (914-956) totalling 657, 634 ha. (39 E/12,13; F/2,3,6-11,14-16; G/1-3; H/3,4).

LOCATION

The project involved reconnaissance exploration and mapping of Precambrian rocks of southeastern Ellesmere, eastern Devon and Coburg Islands (Fig. 4-1). This area is defined as the Alexandra Subprovince of the Churchill Structural Province of the Canadian Shield. Approximately 95 percent of the area, which corresponds to the northern Davis Highlands physiographic subprovince, is covered by permanent ice caps and glaciers. Bedrock is exposed in rugged coastal terrain and nunataks with up to 1200 metres relief.

The 49 contiguous prospecting permits include 657,634 ha (1,625,050 acres) of rock and icefield between Bache Peninsula (lat. 79° 7.5'N) and Talbot Inlet (lat. 78° N) (Fig. 4-2). Base camps were established at Flagler Bay (1982) and Gale Point (1983) on Ellesmere Island, and at Trelove Inlet on Devon Island (1983).

HISTORY

The accounts of several exploration expeditions include notes on the geology of the eastern coast of Ellesmere Island, however, the first systematic geological mapping was done by R.L. Christie of the Geological Survey of Canada in 1961 (Christie, 1962a, b, and 1967). He mapped the Precambrian rocks of the south shores of Bache Peninsula and Alexandra Fiord using Inuit dog sledges for transportation. Christie (1978) also reported on the geology of eastern Devon Island and Krupicka (1973) described granulite facies rocks from the Truelove Inlet area, northeastern Devon Island. Kerr (1972a, b) compiled 1:250,000 scale maps for the Dobbin Bay - Flagler Bay area (NTS 39 G&H).

In 1977, the Geological Survey of Canada mounted a helicopter-supported reconnaissance mapping of the area that allowed the first access to many inland nunataks of eastern Ellesmere Island (Frisch, 1983; Frisch and others, 1978).

Petro-Canada geologists became interested in the mineral potential of the area from reports of gossans and malachite stainings reported by the Geological Survey of Canada (Frisch, 1983; Frisch and others, 1978). They obtained the 43 prospecting permits in January, 1983 in the name of 103912 Canada Inc., a subsidiary company, and relinquished them in January, 1984.

DESCRIPTION

The Precambrian Shield terranes of Ellesmere, Devon and Coburg Islands constitute the Alexandra Subprovince of the Churchill Structural Province. To the west this basement gneiss complex is unconformably overlain by late Precambrian, Cambrian and Ordovician platformal sediments or covered by extensive ice fields; to the east, the gneisses are bound by the shores of Baffin Bay and Jones Sound. Locally, outliers of gently-dipping Neohelikian Thule Group lie nonconformably on the basement complex.

Geological work by Geological Survey of Canada (Frisch, 1983) and Petro-Canada indicate that there were three major crust-forming events in the project area:

1) a middle Archean metamorphic/plutonic complex, termed the 'Devon Island Gneiss Complex'.
2) a late Archean or early Aphebian volcano-sedimentary gneiss complex, termed the 'Alexandra Supergroup'.
3) a series of Aphebian plutonic and migmatitic rocks that formed during the Hudsonian orogenies.

The rocks of the Alexandra Subprovince have undergone several periods of intense structural deformation, partial melting, granulite-facies metamorphism and amphibolite facies retrograde metamorphism. Preliminary evidence suggests that the gneisses of Ellesmere Island continue northeastwards and reappear in Inglefield Land, northeastern Greenland (Frisch and Dawes, 1982).

Rock units

Rock types of the basement complex have been briefly described by Frisch (1983) and Petro-Canada geologists (DIAND Assessment Report 081743) (see Table 4-3). The oldest group of rocks, the Devon Island Gneiss Complex of Petro-Canada geologists, are granulite facies orthogneisses that are characterized by widespread retrograde metamorphism, locally intense deformation, garnets in alumino-silicate-free quartzofeldspathic gneisses and mafic gneisses and abundant migmatite, augen, and lit-par-lit gneisses and cataclastic rocks.

The Alexandra Group (Table 4-3) is a package of granulite - facies metasedimentary and metavolcanic rocks that can be traced from Devon Island northwards across Coburg Island and coastal southeastern Ellesmere Island to the limits of Precambrian exposure on Bache Peninsula (Fig. 4-6). In spite of its high-grade metamorphism and anatexis, this group of rocks has retained its stratigraphic character, with distinctive units or marker beds traceable upwards of 40 km.

Allowing for uncertainties of structural repetition, the Alexandra Supergroup includes up to 12,000 metres of pelitic gneiss, psammo-pelitic gneiss, marble, calcsilicate gneiss, quartzite, intermediate to mafic metavolcanics, and sulphide-facies iron formation. These thicknesses are comparable to the maximum estimated thicknesses of supergroups mapped elsewhere: Grenville Supergroup - 10 to 15 km, Blake River Group - 12 km, Akaitcho Group, Wopmay Orogen - 8 to 10 km, Wernecke Supergroup - 13 km, Yellowknife Supergroup - up to 14 km.

TABLE 4-3: TABLE OF FORMATIONS, EASTERN ELLESMERE ISLAND

QUATERNARY		
	Q	glacio-fluvial deposits
		--------unconformity--------
TERTIARY		
	E	Eureka Sound Formation
		--------angular unconformity--------
PALEOZOIC		
Cambro-Ordovician strata		
	CO	unsubdivided
		--------unconformity--------
		diabase
		--------intrusive contact--------
NEOHELIKIAN		
Thule Group		
	Tg5	Green shale
	Tg4	Thick bedded orthoquartzite
	Tg3	Shale, dolomite, thin bedded sandstone
	Tg2	Amygdaloidal basalt
	Tg1	Sandstone, orthoquartzite, stromatolitic limestone
		--------non-conformity--------
		diabase
		--------intrusive contact--------
APHEBIAN?		
	r	Retrograded gneisses
	Hg	Granite
	Hm	Migmatite and granite gneiss
	Hi	Granite injected tonalite and mafic metavolcanic
		--------intrusive contact--------
	Adi	Metadiabase, metagabbro
	Apx	Pyroxenite
		--------intrusive contact--------
	Atg	Tonalite, granodiorite
		--------intrusive contact--------
ARCHEAN?		
Alexandra Supergroup		
	Avo	Intermediate to mafic metavolcanic
	Adm	Dolomitic marble
	Acm	Calcitic marble
	Acs	Calcsilicate gneiss
	Asf	Sulphide-facies iron formation
	Ape	Pelitic gneiss
	Aps	Psammo-pelitic gneiss
	Aq	Quartzite
		--------anatectic or fault contact--------
ARCHEAN?		
Devon Island Gneiss Complex		
	Ka	Augen gneiss
	Km	Migmatite
	Kt	Tonalite, diorite
	Ko	Orthopyroxene gneiss

White impure quartzite gneisses (Aq) resemble calcite marble from a distance, but are distinguished by well-jointed cliff faces and by blocky talus fans. Psammo-pelitic gneiss (Aps) is the most common rock type in the supergroup. A rusty weathering phase is related to the alteration of finely divided pyrrhotite (1-2%) to goethite. Pale-brown-weathering aluminosilicate-rich migmatite forms the pelitic gneiss unit (Ape). Cordierite and/or sillimanite are common and characteristic of this rock unit.

Sulphide-facies iron formation (Asf) is a conspicuous but volumetrically restricted unit of the Alexandra Supergroup. It consists of pods, lenses, and layers of semi-massive to massive, coarse crystalline pyrrhotite (30 to 90% Po). The largest massive pyrrhotite horizon occurs a few kilometres east of Alexandra Fiord outpost, where it can be traced in outcrop for about 5 km. Within the horizon are discontinuous sulphide pods and lenses. The lenses measure up to 2 metres thick by 15 metres long.

Gneisses containing disseminated (5% to 20%) pyrrhotite with graphite and biotite form many large stratiform gossans. These horizons grade laterally and vertically into rusty psammo-pelitic gneisses (unit Aps) that contain 1% to 5% pyrrhotite. Some sulphide-facies iron-formation lenses are associated with pelitic gneisses; others occur within tonalite or orthopyroxene biotite gneiss.

Sulphide-facies iron formation is distinguished from other iron sulphide occurrences by:

1) its bedded and stratiform character;
2) its association with other paragneiss units;
3) the presence of graphite, indicating deposition of the original black, pyritic mudstone/greywacke under euxinic conditions.

Calcsilicate gneisses (Acs) contain a calcium-silicate mineral assemblage with or without calcite. Typical calcium silicates at granulite facies include diopside-hedenbergite ($CaMgSi_2O_6$-$CaFeSi_2O_6$), sphene ($CaTiSiO_2$,(O,OH,F)), wollastonite ($CaSiO_3$), meionitic scapolite ($3CaAl_2Si_2O_8CaCO_3$), calcic plagioclase, and apatite ($Ca_5(PO_4)_3$). Other less common mineral species include chondrodite, vesuvianite, grossular garnet, magnetite, serpentine, fluorite, scheelite-powellite and arsenopyrite. Many of these may in fact be related to contact metamorphic or metasomatic processes. Many small gossans on Cadogan Glacier and upper Trinity Glacier that are related to marbles and calcsilicate rocks, are formed from the weathering of of disseminated pyrrhotite (5% to 15%).

White calcitic marble (Acm) is the most easily identifiable meta-sedimentary unit in the Alexandra Supergroup. It is possible to establish the gross geological picture of an area by tracing out calcitic marble bands either from air photographs or from a helicopter. Individual marble layers have been mapped out for 40 km in the Inglefield Mountains. The mineralogy of calcite marble is fairly simple: 80% to 90% white crumbly coarse-grained calcite with 10% to 15% diopside or forsteritic olivine, and accessory phlogopite, graphite, sphene, apatite and wollastonite. Some bands of calcite marble may be distinctly orange, pale blue or pale green. True marble is often interlayered with various calcsilicate gneisses.

Dolomitic marble (Adm) occurs on several nunataks along the north coast of Talbot Inlet, 15 km northwest of Cape Faraday. It most commonly contains 10% to 20% bladed, pale-green talc and medium-grained nodules of green translucent serpentine within a dolomite matrix. These nearly pure dolomitic marbles are interlayered with a variety of magnesian calcsilicate rocks, talc-serpentine-calcitic marble, monomineralic talc-rock and magnetite-paraserpentinite.

Well banded biotite-othopyroxene gneisses that dominate outcrops along the north shore of Talbot Inlet are interpreted as intermediate to mafic metavolcanics (Avo).

Aphebian plutonic igneous rocks and plutonic-textured gneisses are abundant throughout the Alexandra Subprovince of Ellesmere and Devon Islands. They show considerable range in composition (granite to pyroxenite) and metamorphism (amphibolite to granulite facies). The youngest igneous rocks are diabase dike swarms.

Neohelikian sedimentary and mafic volcanic rocks of the Thule Group were deposited in a supracratonic basin nonconformably overlying peneplained Archean and Aphebian basement in coastal southeast Ellesmere Island and northwest Greenland (Frisch and Christie, 1982; Dawes and others, 1982). On Ellesmere Island only the basal 1100 metres of the 4.5-kilometre-thick succession have been preserved. Exposures occur on the top of the mountain peaks between Clarence Head and Cape Combermere. The thickest exposure is at Goding Bay and additional outcrops are at Cape Dunsterville, Paget Point, and Gale Point. The northern limit of the preserved Thule Basin strata occurs at an isolated exposure near MacMillan Glacier.

Structure

Structural elements in the region include pre- and post-tectonic isoclinal folds, open concentric folds, shear zones, brittle faults, foliations, and compositional banding and layering. Folds have been classified into three categories; the earliest are tight isoclinal pre-foliation folds that are most easily recognized from the air. The second type is concentric, isoclinal to overturned post-foliation folding that is defined by repetition of stratigraphy. Marble units involved in this folding tend to form tectonic breccias and irregular isoclinal folds, while more competent psammo-pelitic and pelitic gneiss units form overturned structures. These units pinch and swell as the axial zone of the folds is approached. The axial zones seem to be the loci for the concentration of sulphide-facies iron formation at Boger Point and the Alexandra Fiord outpost. The third type of fold occurs as regional-scale low-amplitude warps with fold axes at a high angle to foliation.

Recessive shear zones are common in the Devon Island Igneous Complex. However, the Alexandra Supergroup and Thule Group rocks are displaced along brittle faults that are much narrower than the shear zones. Many of these brittle faults also displace Paleozoic and Tertiary strata. Jones Sound and most of the eastern Ellesmere Island fiords are Miocene grabens formed as a result of displacement on these brittle faults.

Metamorphism

The basement gneisses of the project area have undergone widespread hypersthene granulite facies metamorphism as shown by the co-existence of two pyroxenes in mafic gneisses, the absence of muscovite in sillimanite-quartz-feldspar mineral assemblages and the absence of tremolite in calcareous rocks.

Local variation in metamorphic conditions is common throughout the project area. This is typified by the retrograde metamorphic haloes around granite bodies (i.e. amphibolite - facies assemblages in calcsilicate and mafic gneisses).

Local retrogression also occurs around shear zones, especially on northern Devon Island (Krupicka, 1973). In sulphide-facies iron formation, local retrograde metamorphism is indicated by the alteration of pyroxenes to actinolite and inversion of pyrrhotite to pyrite (such as in the Wyville-Thomson Glacier area).

CURRENT WORK AND RESULTS

Petro-Canada conducted substantial helicopter-supported mineral exploration of the eastern margin of Ellesmere Island in 1982 and 1983. This effort was directed towards geological mapping and interpretation (see Fig. 4-6 and DESCRIPTION) and prospecting using traditional and geochemical, mainly lithochemical, techniques.

Geochemistry:

The 718 rock samples collected in 1982 were used to calculate threshold and anomalous quantities for several elements of interest, using a statistical package developed by Barringer Magenta Ltd. (Table 4-4). An additional 585 rock samples were collected and assayed in 1983. Grab samples were collected in the course of helicopter and ground reconnaissance traversing, as well as detailed rock sampling at 1-metre intervals of the larger sulphide showings. All samples were analyzed for Cu, Pb, Zn, Ag, Ni, Fe, Au and in a few cases, U.

The 1982 work resulted in the designation of 181 mineral occurrences or geochemical anomalies of which the best 20 were recommended for follow-up work in 1983 (Table 4-5). An additional 18 mineral occurrences were discovered in 1983 (Table 4-6).

The 1983 sampling was more selective because the 1982 analytical results indicated that the only geochemical anomalies of interest are found in relatively massive sulphide occurrences. Therefore, there was less incentive to sample all gossans, especially the numerous, poorly disseminated to non-sulphide-bearing "rusty weathering gneisses". Further, with the realization that occurrences of disseminated sulphide are unlikely hosts of economic

TABLE 4-4: THRESHOLD AND ANOMALOUS LIMITS FOR ROCK GEOCHEMICAL DATA - EASTERN ELLESMERE ISLAND

	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Fe %	Au ppb	Ag ppb
Threshold	1800	40	390	925	25	95	2200
Definitely Anomalous	4800	170	5700	1500	30	290	4300

TABLE 4-5: PETRO-CANADA GEOCHEMICAL ANOMALIES 1982

	Name	NTS	Easting	Northing	Elements
1.	Sands Glacier	39F/15	437050	8767280	Cu, Au, Ni, Ag, Co
2.	Cadogan Glacier 4a, 6	39F/8	451000	8690750	Cu, Au, Ag
3.	Tanquary Glacier B	39F/8	470100	8711250	Au, Ag, Zn
4.	Bear Glacier-1	39G/3	546450	8774630	Cu, Ni, Zn, Ag
5.	Leffert Glacier-7 (Rice Strait)	39E/11	504400	8736600	Ni, Fe
6.	Talbot-Trinity 2	39C/14	560850	8658150	Au, Ag, Cu
7.	Trinity Glacier 5	39F/3	553200	8666650	Ni, Cu
8.	Wyville-Thompson 1	39E/5	498600	8695900	Au, Pb
9.	Wyville-Thompson 5	39E/5	481200	8702470	Au, Cu
10.	Penguin-A	39F/3	552100	8669600	Ni, Fe
11.	Talbot Inlet	39F/2	560850	8658150	Pg, Ag
12.	Boger Bay	39C/6	549750	8586000	W, Cu
13.	Thorvald Peninsula	39F/16	475505	8768505	Pb, Au, Zn
14.	Leffert Glacier-4	39E/12	478700	8740400	Ag, Au, Zn
15.	Rutherford-3	39E/13	488000	8755000	Au
16.	Kea-1	39E/13	484500	8754080	Ag, Zn
17.	Cadogan Glacier 7	39F/8	457500	8689050	Cu, Ni, Pb, Zn
18.	Makinson 2	39C/5	529700	8582000	Cu, Ag
19.	Digarmulen 1,2	39E/13	482255	8762250	Pb, Au
20.	Mt. Carey (Eeyore)	39F/16	461200	8759000	Au, Cu, Zn

TABLE 4-6: PETRO-CANADA 1983 MINERAL DISCOVERIES

	Name/Station	Easting	Northing	Map	Zone	Size
1.	Sulphide Showings					
183.	Sterenberg	539400	8544800	39B	17X	medium
184.	Snortin-Nortin	566700	8492700	39B	17X	"
185.	Brae Bay	428000	8401100	48H	17X	large
186.	Gale Glacier	484800	8691000	39E	18X	"
2.	Malachite and related showings					
187.	Easter Island-4	438700	8641400	39C	18X	medium
188.	Belcher Glacier	489800	8395200	48H	17X	"
189.	Thorvald Penin.-2	463200	8770800	39G	18X	"
190.	Cadogan-4b	452100	8689200	39F	18X	"
191.	Easter Island-5	434100	8641500	39C	18X	"
192.	Glentworthia	556100	8523600	39B	17X	"
193.	Penguin-F	551800	8669300	39F	17X	"
194.	Eeyore-2	468300	8757800	39F	18X	large
195.	Leffert Glacier-8	499300	5735000	39G	18X	medium
196.	Sverdrup	540000	8350000	48G	16X	"
197.	Cadogan-4c	448200	8691100	39F	18X	"
198.	Clarence	427600	8522400	39B	18X	"
3.	Arsenide-skarns					
199.	Talbot Inlet 2	445500	8655700	39C	18X	"
4.	Other Occurrences (Barite)					
200.	Cadogan 10	564400	8684600	39F	17X	"

minerals, came the conclusion that, to be potentially economic, a massive sulphide showing must be substantial in size. Small lenses of clearly restricted dimensions were tested only by grab sampling instead of the systematic collection of samples at regular intervals that was applied to a few large showings. Finally, the 1982 results suggested that, where present in geochemically anomalous quantities, economic sulphides are visually distinguishable from barren pyrrhotite or pyrite. As a consequence, visual prospecting is reliable and total dependence need not be placed on geochemical prospecting.

1982:

Petro-Canada's 1982 program in the basement gneisses included all areas as far south as Makinson Inlet. Additional mineral occurrences were sighted in the coastal Thorndike Peaks. In the course of the 1982 field season 181 mineral occurrences were discovered. Of these, about 155 were principally iron sulphide bodies (pyrrhotite with scattered pyrite and traces of chalcopyrite), 22 were malachite, and 4 were thought to be skarn-related sulphide showings. The most significant mineral discovery was the occurrence at Sands Glacier. Rock samples from this occurrence contain up to 13% copper, 0.5% nickel, 0.225% cobalt, 8.23 g/tonne gold, 8.57 g/tonne silver, and 0.34 g/tonne platinum. An additional 18 - 19 mineral occurrences were deemed worthy of follow-up due to their anomalous concentrations of copper, gold, silver and nickel (Table 4-5).

In the course of the 1982 program, Petro-Canada geologists examined all the known sulphide occurrences, including copper-stained rocks on the south coast of Bache Peninsula and along the shores of Buchanan Bay (Christie, 1962a) and gossans that have developed over pyrrhotite - chalcopyrite - sphalerite-rich zones up to 8 m wide in the gneisses (Frisch and others, 1978, p. 138). These gossans were not as impressive as hoped.

1983:

The 1983 program was designed to assess:

1) The Sands Glacier copper-gold occurrence.
2) About 20 lithogeochemical anomalies (copper, gold, nickel, molybdenum) underlain by gneisses.
3) Areas to the south of the 1982 project area that were suspected to be underlain by metasedimentary gneisses similar to those investigated in 1982.

1) 'The Sands Glacier showing was a great disappointment. It was described late in the 1982 season as a stratiform disseminated to massive sulphide gossan at least 200 metres long by 30 to 40 metres thick with at least five semi-continuous sulphide-bearing lenses. Re-investigation showed it to be enclosed in a band of limonite-stained migmatite, 200 metres long. Massive sulphides (chalcopyrite, pyrrhotite, magnetite and pyrite) are restricted to perhaps a dozen pods of several metres each distributed over 30 metres across the east-west strike of the gneisses. The southernmost pods have the highest magnetite content. Pyrite and chalcopyrite (up to 20% locally) is enriched in the central series of sulphide pods, and massive to semi-massive pyrrhotite dominates the northern limits of the occurrence. To the east of the podiform sulphides is a soil gossan (30 m x 10 m) that covers a limonite weathering cap with patches of gypsiferous caliche, malachite and annabergite. Rusty migmatite is terminated abruptly east of the soil gossan by a north-striking linear. The mineralogy, mineralogical variation and structure of the Sands Glacier showing suggest that it may be a metamorphosed sulphide vein rather than an exhalative sulphide horizon.' (DIAND assessment report 081743).

On the basis of follow-up investigations and the 1983 geochemical results, the Sands Glacier showing, although locally enriched in copper, nickel, gold, cobalt and silver, was not found to be large enough to warrant further exploration.

2) The 20 mineral occurrences considered to be worthy of follow-up from the 1982 program were found upon re-investigation to be too small and everywhere too low grade to warrant further exploration.

3) Eighteen new mineral occurrences recognized in 1983 (Table 4-6) include four iron-sulphide showings, twelve malachite and chalcopyrite showings, one arsenide skarn-related showing and one barite occurrence. In addition, rusty psammo-pelitic gneiss horizons and sparsely pyrrhotite-bearing sulphide-facies iron formation can be traced throughout southeast Ellesmere Island, Coburg Island and northern Devon Island.

Although the base and precious metal content of sulphide-facies iron formation have high clarkes of concentration; economic levels are not attained. These rocks have been mapped as discrete metasedimentary lenses rather than mineral occurrences.

Summary of showings:

183. Sterenberg showing

The Sterenberg showing occurs on a south-facing nunatak 25 km west of Mittie Island. Sulphide-facies iron formation and rusty psammo-pelitic gneiss crops out as a roof pendant within pink granite. The iron formation includes three or four layers of disseminated and podiform pyrrhotite exposed for about 1 km along strike. The pyrrhotite is cut by secondary (retrograde?) pyrite veinlets. Although a few samples contain high background copper values, the occurrence has low economic potential.

184. Snortin-Nortin showing

Graphite and pyrrhotite are concentrated in diabase and pyroxenite dike contacts where the dikes cut rusty psammo-pelitic gneisses and quartzites near Cape Norton Shaw. Although the area of iron staining is impressive (1 km x 200-300 m), pyrrhotite is scarce and the economic potential is non-existent.

185. Brae Bay showing

Concentrations of pyrrhotite and pyrite occur along the contacts of four or five diabase dikes south of Brae Bay. The sulphides range from sparse disseminations to massive concentrations with sulphide abundance increasing toward dike contacts. Host rocks are migmatitic quartzo-feldspathic gneiss (Km). Economic potential is low.

186. Gale Glacier showing

Moraine piles at the snout of the Gale Glacier (10 km west of Cape Isabella) are enriched in boulders of massive pyrrhotite, pyrrhotitic quartzite, and laminated pyrite-biotite-gneiss. Source of the moraine must be nearby, possibly up-ice to the west in the south-facing nunataks of Wyville-Thomson Glacier. Although some samples contain high background zinc, no economic sulphide minerals were identified, and the economic potential is considered to be slight.

187. to 198. Malachite and related showings

Malachite occurrences are described collectively. All these showings are small and display a similarity of occurrence. The malachite is found as patchy stains on fracture planes and weathering surfaces within a variety of anatectic gneisses. Although not confirmed in every case, there appears to be a spatial association of malachite staining and either granite contacts or rocks injected by granite veins or granitic leucosome. Chalcopyrite may or may not be present to explain the surface alteration. Where present, chalcopyrite is found in leucosome segregations with sparse magnetite. Malachite stains of several square metres in area can be derived in some cases from a chalcopyrite occurrence of a few tens of square centimetres in area. The malachite patches are commonly scattered over several hundreds of metres of gneiss in each case. The largest malachite-stained area was found at Eeyore-2. Malachite is semi-continuous for 100-150 metres; however, chalcopyrite is rare.

'Eeyore' (194) contains fluorite and traces of scheelite in calcsilicate gneiss adjacent to a stock of aluminosilicate granite. The remaining 'skarn' occurrences contain either scattered pyrrhotite or malachite in or adjacent to regionally metamorphosed and anatectic calcsilicate rocks.

199. Talbot Inlet-2 showing

This occurrence is in a nunatak 2 km south of the Talbot Inlet showing. Disseminated arsenopyrite occurs near a dolomitic marble contact adjacent to quartzite and porphyroblastic orthopyroxene biotite gneiss. The arsenide mineralization appears to be concentrated with lenses of disseminated pyrrhotite or disseminated graphite and magnetite in the axis of an isoclinal fold in a plagioclase-diopside-calcsilicate rock. High nickel values (690 to 1800 ppm) in two samples suggest the presence of gersdorfite (NiAsS) or some other hard heavy tin-white mineral. Gold (1-2.5 ppm) occurs in the nickel-bearing samples. The arsenide mineralization is stratiform and occurs over a length of 10 metres and a width of 2.5 metres. Due to its small size, the showing has limited economic potential.

Also of interest is a boulder of semi-massive arsenopyrite (with sparse copper: sample 3490) found nearby in a lateral moraine. The boulder is unlike the bedrock mineral occurrence, and is presumably derived from some other undiscovered arsenide showing.

200. Cadogan-10 showing

This mineral showing was found on a nunatak 30 km west of Cadogan Inlet on the north side of Cadogan

Glacier. Coarse to very coarse (up to 30 cm) sparry barite, barito-calcite and calcite occurs in the axial zone of a synform in a sequence of calcitic marbles and psammo-pelitic gneisses. Size and origin of the occurrence is unknown.

New discoveries in 1983 were found to lack both size and grade although two high gold assays were returned from the Talbot Inlet-2 showing, and interesting zinc values were found in the till boulders of the Gale Glacier occurrence.

Recommendation

Further surface exploration was not recommended and the prospecting permits were relinquished at the end of 1983.

VICTORIA ISLAND

Victoria Island is underlain by crystalline Precambrian basement rocks, a concordant sequence of five Proterozoic formations of the Shaler Group, which comprises clastics, carbonates, and gypsum-anhydrite, with a sixth unit, the Natkusiak Formation, comprising basalt flows and volcaniclastics (Thorsteinsson and Tozer, 1962). Closely related to these volcanics are widespread diabase-gabbro sills and dikes (Christie, 1964) that have the same age (650 my. B.P.), chemical and petrological characteristics as the Coronation sills to the south (Baragar, 1977).

The above-mentioned rocks are exposed in a synclinal structure called the Minto Arch (Fortier and others, 1963), that dominates the geology of northwestern Victoria Island, (3 in Fig. 4-1). Precambrian strata of the Minto Arch form a northeast-trending synform, named the Holman Island Syncline (Fig. 4-7), however, the Minto Arch became a positive topographic feature during the Paleozoic. It underlies most of the Diamond Jenness Peninsula, the Saneraun Hills and the Shaler Mountains (Fig. 4-8).

"The angular discordance between the Lower Palaeozoic and the Precambrian rocks of the Minto Arch demonstrates that the Walker Bay anticline and the Holman Island syncline were folded prior to deposition of the earliest Palaeozoic rocks in the area. Later crustal movements, however, are clearly responsible for the present position of the Minto Arch as a structural high, or uplift, with homoclinal sequences of Palaeozoic rocks dipping away from the Arch. There is no evidence in the stratigraphic column of the map-area to suggest that the Minto Arch underwent sudden uplift at any time. The essentially homoclinal sequence of Upper Cambrian(?) to Upper Devonian strata that extends through Prince Albert Peninsula into northeast Banks Island presumably developed as a result of the positive movement that effected the Minto Arch. The uplift is, therefore, presumably Upper Devonian or later. Lower Cretaceous rocks rest unconformably upon the Palaeozoic strata and this suggests that the uplift of the Minto Arch took place prior to the Lower Cretaceous.

The Boothia Arch, east of the map-area, is known to have moved positively, and relatively violently, in late Silurian or early Devonian time. Latest Silurian and early Devonian rocks are not exposed on Victoria Island; consequently there is no record of events for this period. It is conceivable that the Minto Arch moved in late Silurian or early Devonian time (i.e., at the time of movement of the Boothia Arch), but this is improbable." (Thorsteinsson and Tozer, 1964, p. 72).

NORTHWEST VICTORIA ISLAND RECONNAISSANCE
PROSPECTING PERMITS 974-997

Panarctic Oils Ltd.	Copper, Silver
P.O. Box 190	77 G/13, 78 B/14
Calgary, Alberta T2P 2H6	87 E/13,G/1,H/3, 4,7,9,10,16
	88 A/1
	$70^\circ52'$-$72^\circ08'$N.
	$111^\circ30'$-$116^\circ30'$W

REFERENCES

Baragar (1976, 1977); Baragar and Loveridge (1982); Christie (1964); Newbury (1969); Palmer and Hayatsu (1975); Thorpe (1972); Thorsteinsson and Tozer (1962).

PROPERTY

Twenty-four prospecting permits (974-997) encompassing 593,648 ha.

LOCATION

The permit areas contain most of the volcanic rocks of the Natkusiak Formation of northwestern Victoria Island. They can be broken into two groups; the first, consisting of nine permits, occupies the central core of Diamond Jennes Peninsula and lies immediately south of the Kuujjua River. The second (15 permits) includes most of the northeast-trending Saneraun Hills and Shaler Mountains (Fig. 4-8). The area is 50 to 275 km northeast of Holman Island or an average of 425 km northwest of Cambridge Bay, which

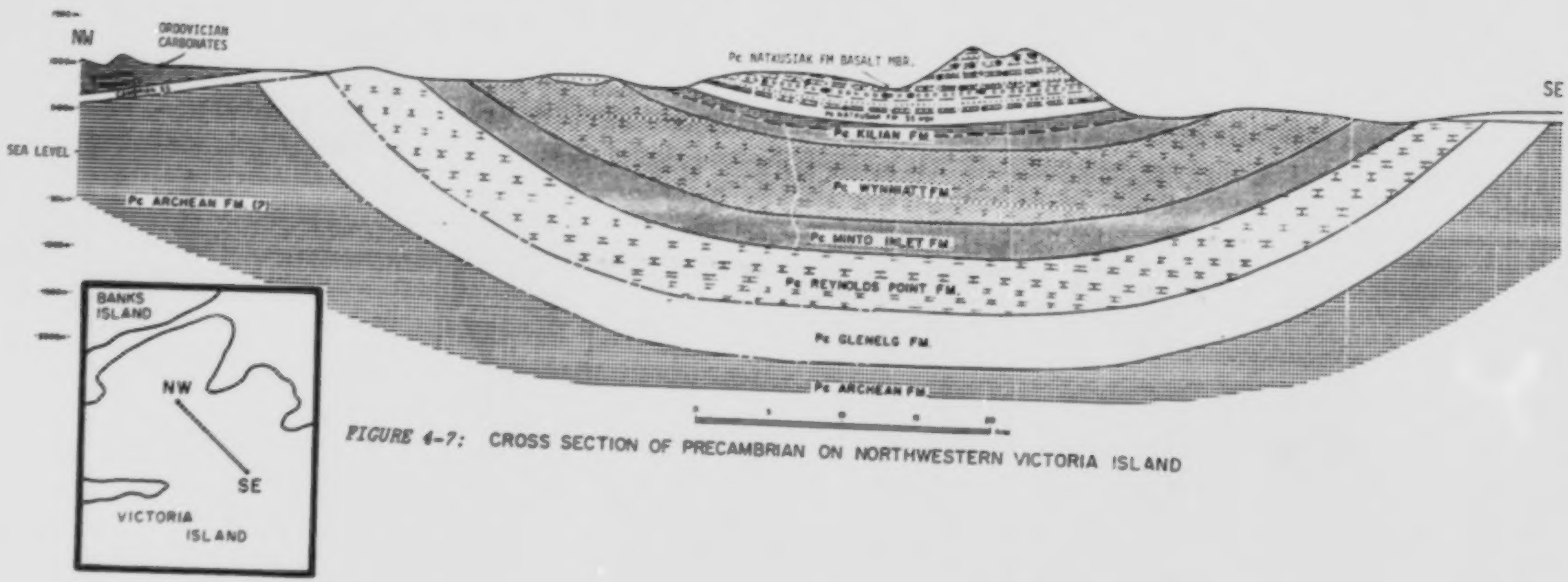
NW
ORDOVICIAN CARBONATES
SEA LEVEL
Pc ARCHEAN FM (?)
Pc NATKUSIAK FM BASALT MBR.
SE
Pc KILIAN FM
Pc WYNNIATT FM
Pc MINTO INLET FM
Pc REYNOLDS POINT FM
Pc GLENELG FM
Pc ARCHEAN FM
BANKS ISLAND
NW
SE
VICTORIA ISLAND

FIGURE 4-7: CROSS SECTION OF PRECAMBRIAN ON NORTHWESTERN VICTORIA ISLAND

LEGEND FOR FIGURES 4-7 and 4-8

QUATERNARY

18	Areas of thick glacial drift; mainly morainal; outcrops of bedrock are very scarce

CAMBRIAN? ORDOVICIAN AND SILURIAN

10	10a, Cambrian?, sandstone, minor shale, siltstone, dolomite 10b, Ordovician and Silurian, dolomite, minor chert, shale, sandstone

LATE PRECAMBRIAN

9	Gabbro dykes and sills; sills not mapped
8	NATKUSIAK FORMATION: basalt flows; minor aggolmerate;

SHALER GROUP (3-7)

7	KILIAN FORMATION: gypsum, anhydrite, shale, sandstone, limestone, siltstone
6	WYNNIATT FORMATION: limestone; minor dolomite, shale, sandstone
5	MINTO INLET FORMATION: gypsum, anhydrite; minor sandstone, limestone, shale, dolomite; siltstone
4	REYNOLDS POINT FORMATION: limestone, sandstone; minor siltstone, shale
3	GLENELG FORMATION: sandstone, limestone, shale, siltstone, dolomite, conglomerate;

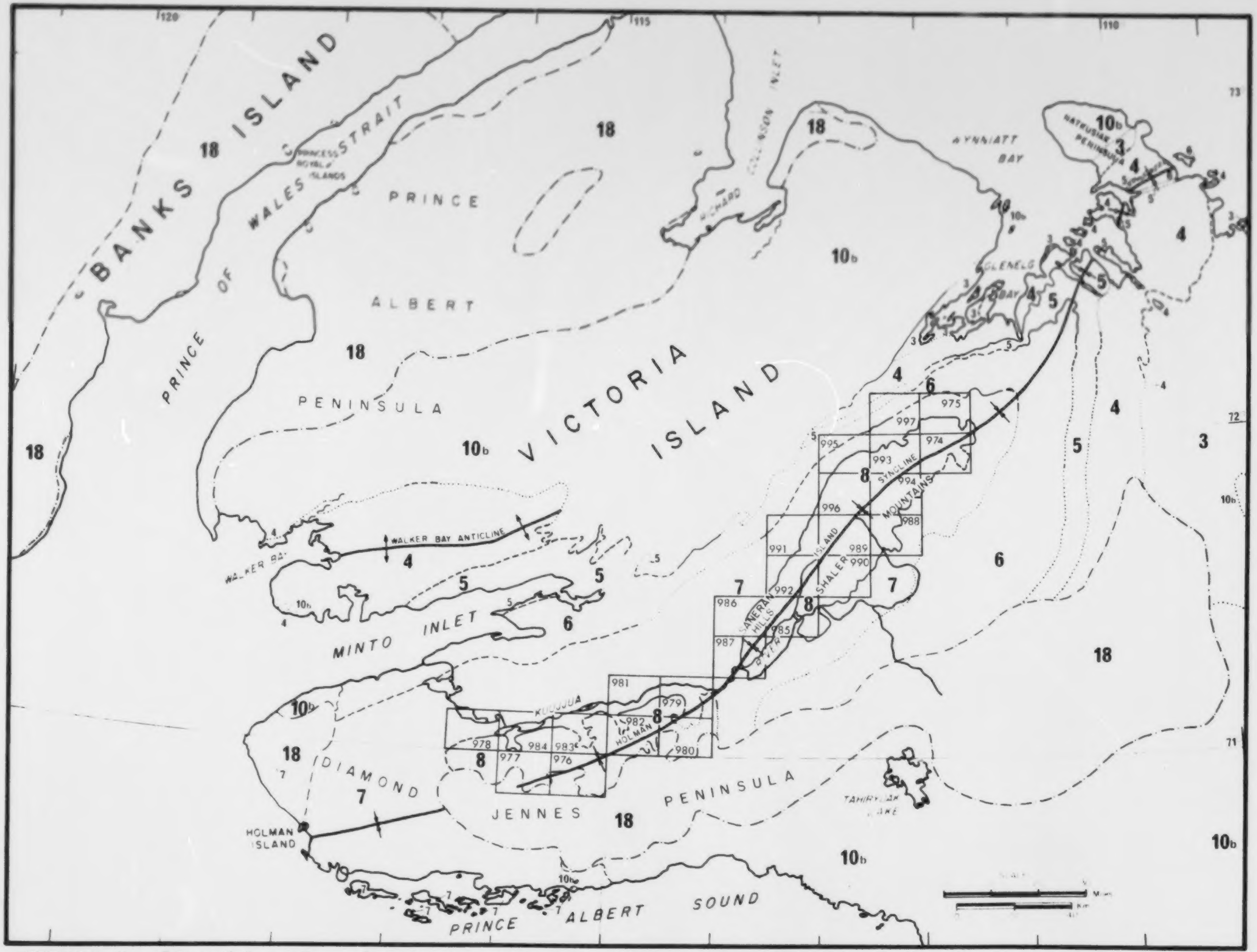
120
115
110
73
72
71
BANKS ISLAND
PRINCE OF WALES STRAIT
PRINCESS ROYAL ISLANDS
PRINCE ALBERT PENINSULA
VICTORIA ISLAND
COLLINSON INLET
RICHARD
WYNNIATT BAY
NATKUSIAK PENINSULA
GLENELG BAY
SYNCLINE
WALKER BAY
WALKER BAY ANTICLINE
MINTO INLET
SHALER MOUNTAINS
ISLAND SYNCLINE
CANERAN HILLS
RIVER
KUUJJUA
HOLMAN
DIAMOND JENNES PENINSULA
HOLMAN ISLAND
TAHIRYUAK LAKE
PRINCE ALBERT SOUND
18
10b
3
4
5
6
7
8
975
997
974
995
993
994
996
988
991
989
990
986
992
987
985
981
979
982
980
978
977
984
983
976
Scale
Miles
Km

FIGURE 4-8: Map of Precambrian geology and permit areas, Northwestern Victoria Island, modified (from Thorsteinsson and Tozer, 1962)

are the only established communities on Victoria Island. However, the Panarctic Oils Ltd. mineral camp was resupplied by Twin Otter STOL aircraft from their base at Rae Point, Melville Island.

HISTORY

The occurrence of copper on Victoria Island was first reported by V. Steffanson in 1913 on the basis of reports given to him by Inuit in Prince Albert Sound. However, Thorsteinsson and Tozer (1964, p. 77) were the first people of European origin to observe copper ('a few small flecks and flakes') "in situ" in the volcanic rocks of the Natkusiak Formation volcanics.

During the years 1968-70, copper exploration in the Coppermine River area 'spilt over' to Victoria Island as the Muskox Syndicate, Grandroy Mines Ltd. and the M.J. Boylen Engineering Co. Ltd. prospected and explored the Natkusiak Formation for copper. This work resulted in the discovery of numerous copper showings and limited mapping, drilling and geophysics were done in an attempt to delineate the economic potential of some of the best showings. Many of the initial targets were vein-type deposits, associated with a series of north-south faults that transect the Proterozoic section (Thorpe, 1972, p. 141-145).

Panarctic Oils Ltd. acquired Prospecting Permits 974 to 997 on February 1, 1983.

DESCRIPTION

The Natkusiak Formation, as defined by Thorsteinsson and Tozer (1964, p. 37) is a sequence of volcanic rocks that consists of dark-coloured, basaltic flows and pyroclastic sediments. This formation rests disconformably on the Kilian Formation of the Shaler Group and includes the youngest Precambrian layered rocks in the area. The Natkusiak Formation is confined to Victoria Island, where it is exposed in two detached belts along the axis of the Holman Island Syncline.

The formation is named for Natkusiak, late resident of Holman and well-known travelling companion of Arctic explorer Vilhjalmur Stefansson. Natkusiak's grave is in the Holman cemetery. The type section of the Natkusiak Formation is some 25 km south of Glenelg Bay, northern Victoria Island.

The formation attains a maximum thickness of about 300 m at about longitude 112°30'W. Where individual flows have been recognized, they are about 30 m thick. Amygdules commonly characterize the lower and upper parts of flows, whereas the intermediate rock is dense basalt. Red and green agglomerate, commonly poorly indurated and cut by thin veins of calcite, is locally present at the base of the formation. The agglomerate comprises fragments of volcanic rocks, bombs, and baked sedimentary rocks of various types that are embedded in a matrix of calcite and tuff; it varies from zero to 100 m in thickness.

Baragar (1976 and 1977) measured several sections of Natkusiak Formation volcanics for detailed geochemical and paleomagnetic studies. He related them to the Franklin magmatic province (or Franklin Magnetic Interval) of late Hadrynian time (i.e., circa 600 Ma. B.P.). They are the only known surface expression of this event that also includes the Coronation dolerite sills and sheets (Christie, 1964) and the Franklin diabase dikes (Fig. 4-9).

The late Hadrynian age assumed for the magmatic rocks is based upon a K-Ar age determination of 640 Ma for one of the sills reported by Christie (1964) and K-Ar isochron age of 625 Ma determined for the basalts by Palmer and Hayatsu (1975). Confirmation of these ages by Rb-Sr isochron was attempted; the Rb/Sr ratios in the dolerites are uniformly low with limited spread. They cluster about a 2.2 Ga reference isochron (Baragar and Loveridge, 1982). An age of 2.2 Ga is geologically unreasonable. This result is thought to reflect contamination of late crystallizing fractions of the magma by solutions from Archean basement, through which the magma passed. A secondary isochron indicating 384 Ma is also unexplainable, but may be due to contamination or post-Devonian uplift.

"The Natkusiak basalts are typical plateau basalts which have erupted, for the most part, in a subaerial environment. Each flow comprises a massive base, with the exception of a thin amygdaloidal zone at the bottom, and highly amygdaloidal top. The top ranges from 1/4 to 1/10 the thickness of the flow, although some thin flows are almost entirely amygdaloidal. Most flows have a pronounced 'sheeting' structure which is parallel or subparallel to their contacts, and is most closely-spaced at their tops. Weathering of the sheeted basalts is commonly severe. The thinner flows are sheeted throughout and the attendant weathering makes a fresh sample difficult to obtain. In the thicker flows, the lower portion is generally unsheeted and fresh. Almost certainly the sheeting structure is inherited from a primary feature such as flow layering, but it has been much modified by weathering and produces a very friable rock." (Baragar, 1976, p. 350).

The Natkusiak Formation contains copper-bearing flood-basalts similar to those of the Coppermine River area and the Keeweenawan Peninsula of Upper Michigan. Reconnaissance prospecting of Prospecting Permits 68-81 (originally granted to Ashmore Gold Mines Ltd.), NTS 87H/7,9 and 16, in 1968 resulted in the discovery of more than 100 showings of chalcocite, bornite, malachite, azurite, chalcopyrite and native copper (Thorpe, 1972, p. 142).

"Some native copper and chalcocite occur in amygdaloidal flow tops, in flow-top breccias, and as disseminations and fracture fillings in massive basalt. However, mineralized zones related to fault zones, generally mineralized fault breccias, were considered to be the most important type of showing.

Showing W5 is the most important zone of mineralization that was discovered. The mineralization occurs along a fault which strikes northwest and extends at least 40 miles (65 km) across the Precambrian rocks, and possibly a further 30 miles (50 km) across the Paleozoics to the northwest. The showing is located at approximately 71°52'N and 112°43'W. Chalcocite, bornite, chalcopyrite and pyrite occur in fault breccia, as veins, and as disseminated replacement masses along the fault zone. Some narrow veins of massive sulphides occur in the country rock on either side of the fault, and some of the copper mineralization occurs in quartz-prehnite veins. The mineralized zone is evident mainly from fragments in talus which are distributed along a length of 1,000 ft. Blocks of nearly massive chalcocite up to 1 ft. across are present along the zone. High-grade samples assayed 10-30% copper and 15-95 g/t or ppm silver"(Thorpe, 1972).

A number of other showings were found that are considered to be of the fault breccia-replacement type and of possible significance. These showings contain semi-massive or massive chalcocite, but all except three consist only of talus fragments.

Newbury (1969) studied the copper showings of claims on the southwestern block of Natkusiak Formation (Diamond Jenness Peninsula). He described epigenetic native copper in permeable zones, prehnite-bearing vugs, amygdules and fractures. Chalcocite apparently formed at a water table from vadose copper bearing fluids.

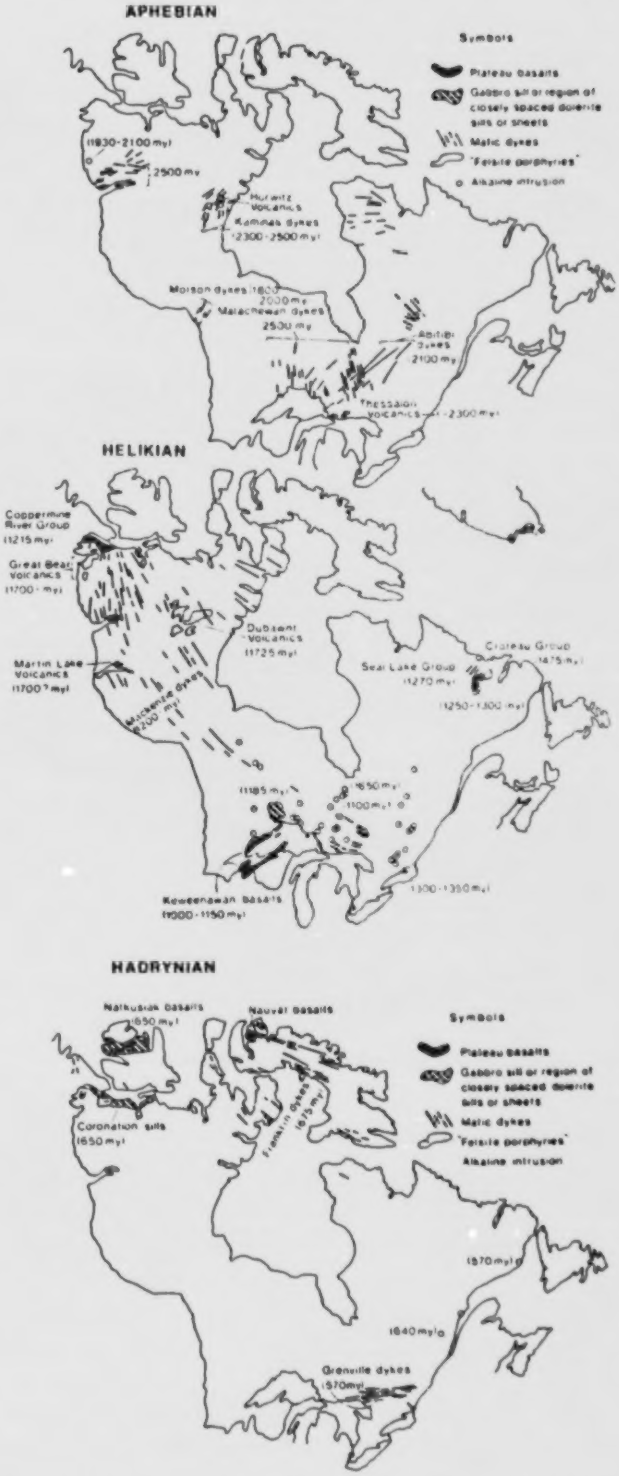
APHEBIAN
Symbols
Plateau basalts
Gabbro sill or region of closely spaced dolerite sills or sheets
Mafic dykes
"Felsite porphyries"
Alkaline intrusion
(1830-2100 my)
2500 my
Hurwitz Volcanics
Kaminak dykes
(2300-2500 my)
Molson dykes (1800-2000 my
Matachewan dykes
2500 my
Abitibi dykes
2100 my
Thessalon volcanics
2300 my
HELIKIAN
Coppermine River Group
(1215 my)
Great Bear Volcanics
(1700 - my)
Dubawnt Volcanics
(1725 my)
Martin Lake Volcanics
(1700? my)
Mackenzie dykes
1200 my
Seal Lake Group
(1270 my)
Croteau Group
1475 my
(1250-1300 my)
(1185 my)
1650 my
1100 my
1300-1350 my
Keweenawan basalts
(1000-1150 my)
HADRYNIAN
Natkusiak basalts
(650 my)
Nauyat basalts
Symbols
Plateau basalts
Gabbro sill or region of closely spaced dolerite sills or sheets
Mafic dykes
"Felsite porphyries"
Alkaline intrusion
Coronation sills
(650 my)
Franklin dykes
675 my
(570 my)
(640 my)
Grenville dykes
(570 my)

FIGURE 4-9: Proterozoic continental basaltic flood lavas and dike swarms, northern Canadian Shield, (from Baragar, 1977)

CURRENT WORK AND RESULTS

1982:

Several traverses were made to study the lower Paleozoic rocks, mainly carbonates, of southern and central Prince Albert Peninsula, as well as the larger of the Princess Royal Islands. The main purpose of this work was to obtain samples of the petroliferous Blue Fiord Formation of Devonian age. Black, tarry material with a strong petroliferous odour was found in Blue Fiord Formation of Princess Royal Islands. These oil seeps have been known for some time.

The main purpose of exploration was to discover and assess copper and silver showings in the basalt member of the Natkusiak Formation and sulphides in the Proterozoic sediments, particularly the calcareous mudstones and carbonates of the Kilian Formation. Most of this work was done in the Saneraun Hills-Shaler Mountains or northeastern block of Natkusiak Formation.

Geochemistry and Geophysics

Stream water and stream sediment samples were collected from known Cu showings, as well as from areas where none are known. The water samples were analyzed for U, Cu, Ni, Fe and Mn; while the stream sediments were analyzed for U, Au, Ag, Cu, Ni, Fe and Cr. Stream waters produced very little indication of anomalous results, while stream sediments were not consistent and impossible to obtain at a fair number of sites. They did show a good correlation between Cu and Ag, and Ni and Cr.

A 3 x 2 km grid was established near the northern end of the Saneraun Hills and a couple of hundred soil samples and radiometric readings were taken. Copper assaying up to 1760 ppm and gold up to 90 ppm were the only elements to yield high anomalies. The radiometric survey did not produce interesting results.

Mapping and Prospecting

Panarctic Oils Ltd. geologists examined four areas of copper showings; two in the northeastern block (at 71°48'N, 112°40'W and 71°30'N, 113°15'W) which had been at least partly examined by the Muskox Syndicate and Grandroy Mines Ltd.; a small basaltic outlier to the southeast of the northern block (71°28'N, 113°10'W); and in the west end of the southwestern block (71°10'N, 71°40'W). Four main types of copper-silver showings were recognized in these areas; a) vein type - mainly massive chalcocite with minor native copper, b) filling vesicules and voids in vesicular and pyroclastic basalts, c) fracture fillings - similar but narrower than veins, and d) disseminated copper minerals in massive or pyroclastic basalts. The fracture fillings are commonly malachite and/or azurite smears along fracture planes. They occasionally are rich in silver and several spectacular pieces of native copper have been obtained from them.

About half of the showings are in outcrop; the rest are in talus or frost heaves. Native copper is the most common protore and malachite is the dominant secondary mineral. Lesser amounts of cuprite, chalcocite, chalcopyrite, bornite and azurite are found. Minor amounts of native silver are associated with native copper. Pyrite is rare, but specular and earthy hematite are both common.

Native copper was found in all types of vesicular basalt, however, the highest grades were in a medium to dark green variety. Vesicles in this rock-type are normally filled with native copper, calcite, silica and prehnite; minor amounts of chrysacolla, malachite, chlorite, zeolites and serpentine are also present.

No evidence of economic mineralization was found in the Proterozoic sediments of the Shaler Group, however, potential for sedimentary copper mineralization similar to the White Pine Mine of Keewanawan of northern Michigan exists in the Upper member of the Kilian Formation immediately beneath the Natkusiak Formation.

1983:

During the 1983 field season the first three weeks were devoted to a stream sediment reconnaissance program. A total of 421 samples were taken in duplicate. One sample was a coarse fraction of the sediment, the other the finer fraction. The coarser fraction was examined by microscope in Calgary for any rock fragments containing copper-bearing minerals. The finer fractions were sent to a commercial lab for copper and silver analysis. The resulting analyses were plotted and contoured on a 1:250,000 scale map and a total of 16 copper and/or silver anomalies were discovered; some of them covering areas of previously known mineralization, others not.

Later in the summer, after the geochemistry was complete and the results were analysed and compiled, several of the anomalous areas were examined on the ground. The source of the mineralization was traced in several cases to various sources in the basalts such as vein chalcocite, disseminated native copper in the vesicular flow tops of the basalts, native copper in veins and veinlets or disseminated mineralization in massive flows (possibly primary mineralization).

Several days were spent on the old W-5 showing of Muskox Mines Syndicate in an effort to determine the extent of the mineralization, which occurs as vein sulphides and as native copper in vesicular flows or flow tops.

CENTRAL ARCTIC: CORNWALLIS LEAD-ZINC DISTRICT

The Cornwallis Lead-Zinc District is in and was controlled by tectonic elements of the Cornwallis Fold Belt, a steep-sided anticlinorium of Proterozoic to Devonian formations (Table 4-7) that overlie a basement horst (Kerr, 1977a and 1977b). The deformation in the Cornwallis Fold Belt can be attributed to several pulses of differential vertical uplift of the underlying Boothia Horst. It was formed mainly by the Cornwallis Disturbance, which consisted of four main pulses or cycles that began with uplift and erosion of the fold belt and was followed by broader regional subsidence and resumption of deposition (Kerr, 1977a). The Cornwallis Disturbance lasted from Early Silurian to Late Devonian. Each uplift or tectonic pulse is marked by a regional unconformity of varying local significance (Table 4-7).

The Cornwallis Fold Belt is centered at Resolute Bay in the Central Arctic of Canada. The northern half coincides with the Cornwallis Lead-Zinc District of Kerr (1977b) and includes all of Cornwallis Island and Little Cornwallis Island, the eastern margin of Bathurst Island and the west and central two-thirds of the Grinnell Peninsula of northwestern Devon Island (Fig.2-28). In addition to establishing the geological framework of the region, Kerr (1977a, 1977b) outlined four probable controls on mineralization (Table 4-8) that are remarkably consistent with regard to lead-zinc deposits and prospects in the region, including the large, high-grade Polaris deposit. The region has been mapped geologically by Thorsteinsson and Kerr (1968).

The Cornwallis Lead-Zinc District of the Central Arctic was the scene of renewed mineral exploration in 1980-81 by Cominco Ltd. who obtained and explored

TABLE 4-7: STRATIGRAPHY AND TECTONIC EVENTS OF THE CORNWALLIS LEAD-ZINC DISTRICT (from Kerr, 1977b)

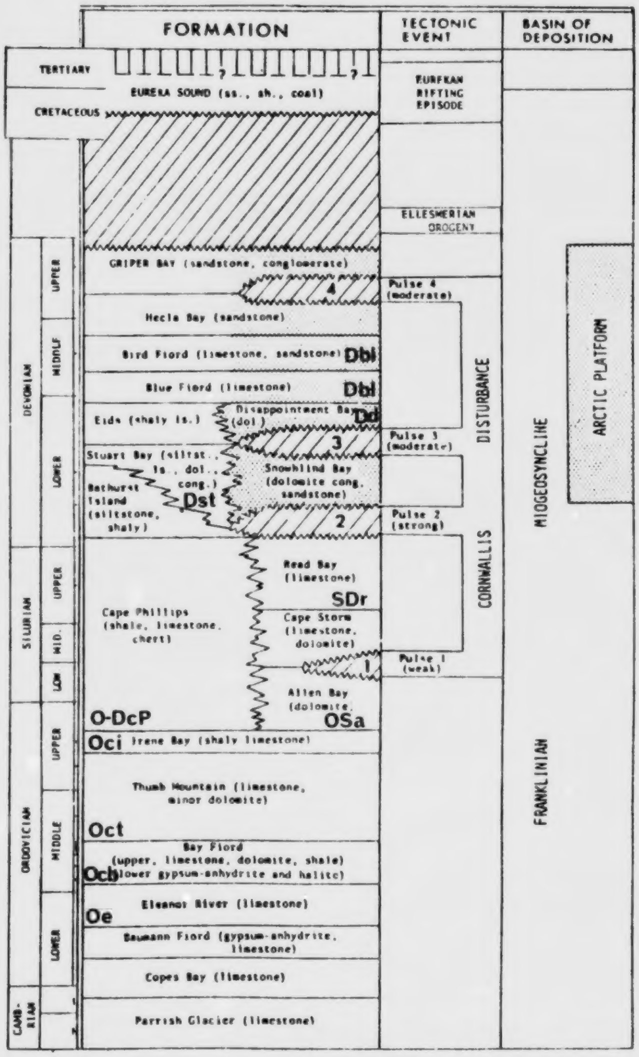
FORMATION
TECTONIC EVENT
BASIN OF DEPOSITION
TERTIARY
CRETACEOUS
EUREKA SOUND (ss., sh., coal)
EURFKAN RIFTING EPISODE
ELLESMERIAN OROGENY
DEVONIAN
UPPER
MIDDLE
LOWER
GRIPER BAY (sandstone, conglomerate)
4
Pulse 4 (moderate)
Hecla Bay (sandstone)
Bird Fiord (limestone, sandstone)
Dbl
Blue Fiord (limestone)
Dbl
Eids (shaly ls.)
Disappointment Bay (dol.)
Dd
3
Pulse 3 (moderate)
Stuart Bay (siltst., ls., dol., cong.)
Bathurst Island (siltstone, shaly)
Dst
Snowblind Bay (dolomite cong. sandstone)
2
Pulse 2 (strong)
DISTURBANCE
CORNWALLIS
ARCTIC PLATFORM
MIOGEOSYNCLINE
SILURIAN
UPPER
MID.
LOW
Read Bay (limestone)
SDr
Cape Phillips (shale, limestone, chert)
Cape Storm (limestone, dolomite)
1
Pulse 1 (weak)
Allen Bay (dolomite)
OSa
O-DcP
ORDOVICIAN
UPPER
MIDDLE
LOWER
Oci
Irene Bay (shaly limestone)
Thumb Mountain (limestone, minor dolomite)
Oct
Bay Fiord (upper, limestone, dolomite, shale) (lower gypsum-anhydrite and halite)
Ocb
Eleanor River (limestone)
Oe
Baumann Fiord (gypsum-anhydrite, limestone)
Copes Bay (limestone)
CAMBRIAN
Parrish Glacier (limestone)
FRANKLINIAN

TABLE 4-8: CONTROLS ON MINERALIZATION IN THE CORNWALLIS LEAD-ZINC DISTRICT (from Kerr, 1977b)

(1) the host is the upper bioclastic part of the Ordovician Thumb Mountain Fm. (12 of 14, the other 2 are also in carbonate).

(2) the host rock is locally brecciated dolomite (14 of 14, sparry dolomite veining known as pseudobreccia is common).

(3) the showings lie within the bounds of the Cape Phillips shale basin and structurally higher than the shale (10 of 14, the Cape Phillip shales may be a source of the metals).

(4) the host is overlain unconformably by the Disappointment Bay Fm., (Pulse 3 in Table 4), (7 of 8, one is in the Disappointment Bay and 6 are unknown).

10 new prospecting permits (Gibbins, 1984). However, 1982 work was reduced to remapping parts of two permits and 1983 work to claim-staking on Kalivik Island, a small island in Crozier Strait, 17 -19 km north-northwest of the Polaris Mine.

As noted earlier and in Chapter 2, Cominco Ltd.'s Polaris Mine began commercial production in March, 1982 succeeding the Nanisivik Mine as the world's most northerly metal mine.

PROSPECTING PERMITS 703-704

Cominco Ltd.	Lead,Zinc
1700-120 Adelaide St. W.	58 G/11,6
Toronto, Ont., M5H 1T1	75°22'N, 94°45'W

REFERENCES

Gibbins (1984); Gibbins and others (1977); Kerr (1977a, 1977b); Padgham and others (1976; Thorsteinsson (1973); Thorsteinsson and Kerr (1968). DIAND assessment report 081707.

PROPERTY

Prospecting Permit 703 (Musk Ox - Caribou Anticline)	58 G/6 NW
Prospecting Permit 704 (Stuart River)	58 G/11 SW

(Note: Permit 704 also includes the WALRUS claims)

LOCATION

The permits are between the Stuart and Gill Rivers of northernmost Cornwallis Island. The area is 100 to 130 km due north of Resolute Bay (4 in Fig. 4-1 and Fig. 4-10).

HISTORY

Cominco Ltd. held Prospecting Permit 53 (NTS area 58 G / 6) from 1966 to 1967 and Canadian Superior Exploration Ltd. held Prospecting Permit 292 (NTS area 58G/6) from 1973 to 1975 (Gibbins and others, 1977).

Prospecting Permits 701, 703 and 704, along with 8 adjacent permits, were acquired in 1980. Geological

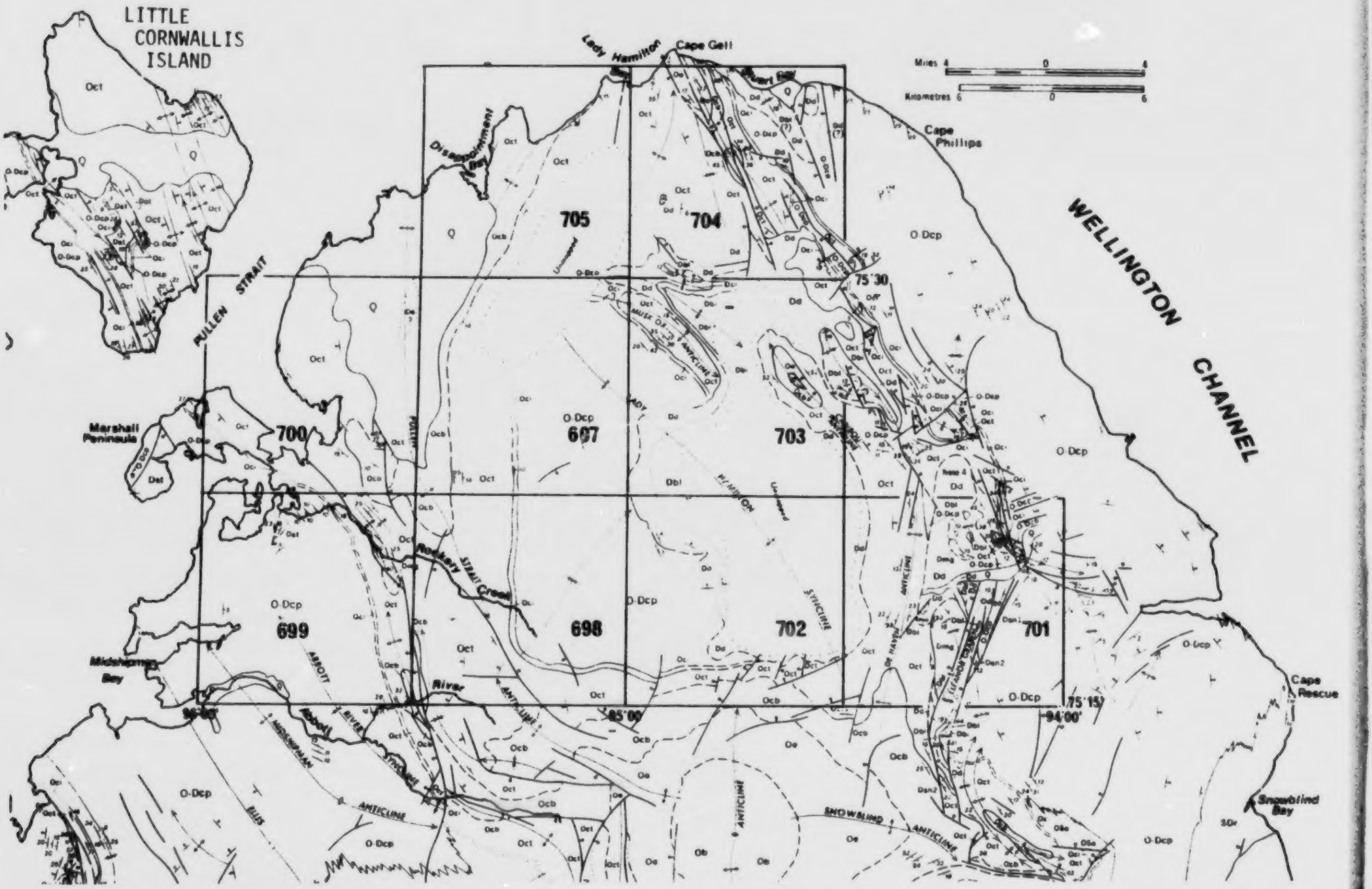
LITTLE CORNWALLIS ISLAND
Lady Hamilton
Cape Gell
Cape Phillips
WELLINGTON CHANNEL
PULLEN STRAIT
Disappointment Bay
Marshall Peninsula
Midshipman Bay
Rookery Creek
Abbott River
Cape Rescue
Snowblind Bay
Miles
Kilometres
705
704
700
697
703
699
698
702
701
75°30'
75°15'
94°00'
95°00'
96°00'
ANTICLINE
SYNCLINE
SNOWBLIND ANTICLINE
Oct
O-Dcp
Q
Dd
Ocb

FIGURE 4-10: Geology of prospecting permits northern Cornwallis Island (from Thorsteinsson and Kerr, 1968). See Table 4-7 for explanation of unit abbreviations.

mapping and geochemical sampling was done on Prospecting Permits 703 and 704 in 1980-81. This work resulted in the discovery of 14 showings and re-interpretation of much of the Thumb Mountain Formation as Bay Fiord, Disappointment Bay and Blue Fiord Formations (Gibbins, 1984, p.106).

The WALRUS 1-40 claims, near the center of permit area 704, were staked by Cominco Ltd. in 1965 to cover geochemical anomalies and small surface showings. These claims were explored in 1966 by soil sampling, IP surveying and geological mapping. Seven holes (115 m) tested a 370 m IP anomaly (Padgham and others, 1976, p.42). The results of this drilling were described as inconclusive.

In 1970, 12 km of gravity survey and additional geological mapping were completed. The WALRUS claims were taken to lease in 1974 (Gibbins and others, 1977).

DESCRIPTION

Geological maps of the area (Thorsteinsson, 1973; Thorsteinsson and Kerr, 1968) show that much of the permit areas are underlain by Thumb Mountain Formation, host rock of the Polaris and Eclipse deposits and many other lead-zinc showings of the Cornwallis Lead-Zinc District (Kerr, 1977b). The remaining main controls of mineralization in the district, namely

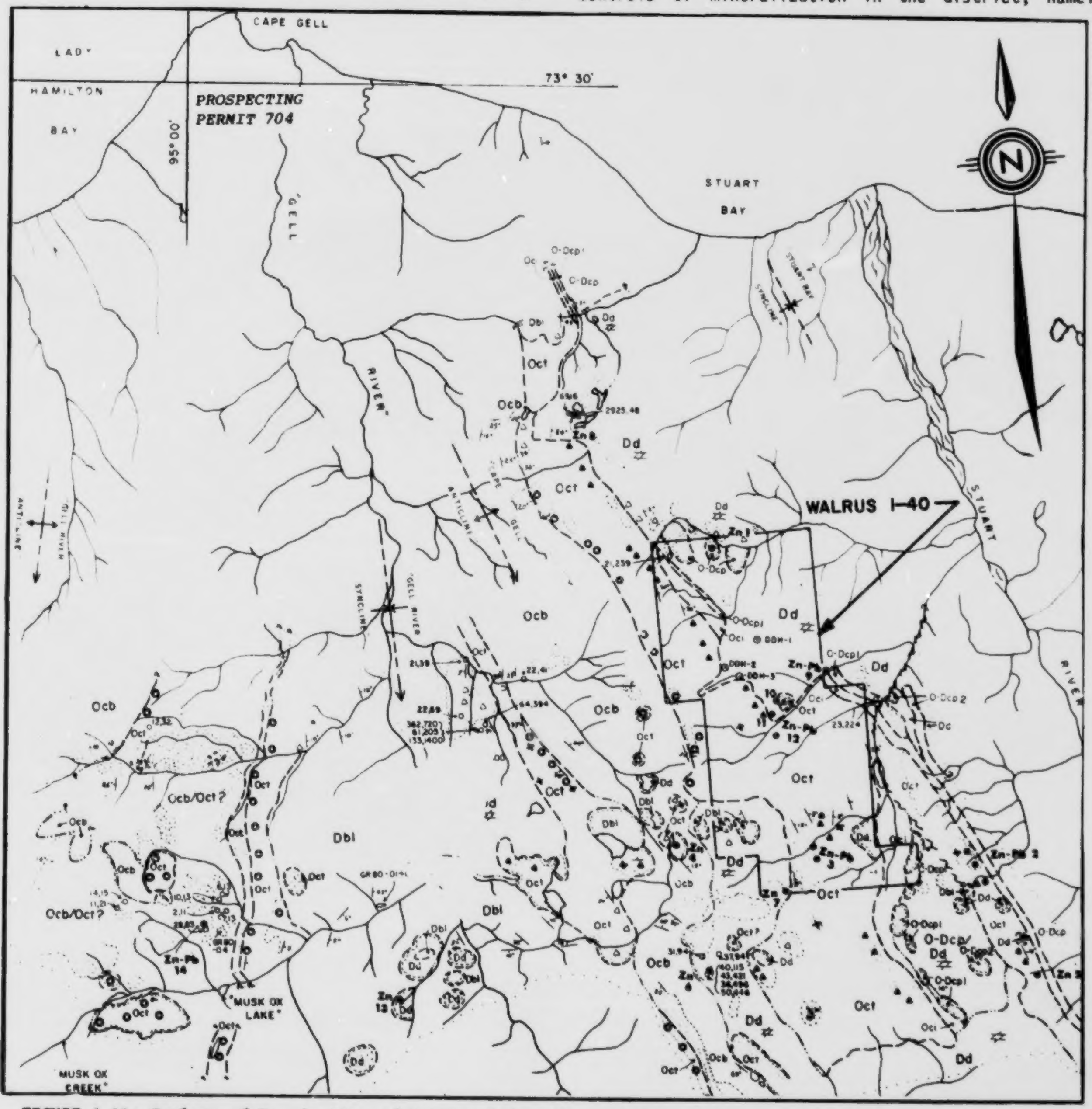
CAPE GELL
LADY
HAMILTON
BAY
73° 30'
95° 00'
PROSPECTING
PERMIT 704
N
STUART
BAY
GELL
RIVER
STUART BAY SYNCLINE
CAPE GELL ANTICLINE
GELL RIVER SYNCLINE
GELL RIVER ANTICLINE
WALRUS I-40
STUART
RIVER
Ocb
Oct
Dd
Dbl
O-Dcp
O-Dcpl
Ocb/Oct?
Zn 8
Zn 1
Zn-Pb 12
Zn-Pb 3
Zn-Pb 2
Zn 7
Zn 6
Zn 13
Zn-Pb 14
DDH-1
DDH-2
DDH-3
"MUSK OX
LAKE"
MUSK OX
CREEK"

FIGURE 4-11: Geology of Permit 704 and WALRUS claims (from Cominco assessment reports)

dolomite breccia, the Cape Phillips Formation shale facies and the relationship with the sub-Disappointment Bay Formation unconformity (Kerr, 1977a, 1977b), are also present and indicate a favourable exploration environment.

Prospecting Permit 703 contains the Lady Hamilton Syncline in the southwest and the Musk Ox and Caribou fold structures in the northeast (Fig. 4-10). All fold structures are northwest-trending. The central and southern portions are poorly drained, unmapped areas with numerous lakes and few outcrops. This region is presumably underlain by recessive Devonian strata. Faulting is intense only within the Caribou Fold structure. The youngest and oldest strata exposed are the Devonian Bird Fiord Formation (within the Musk Ox and Caribou synclines) and the early to middle Ordovician Eleanor River Formation (within the Caribou Anticline). Showings in the southwest part of the Caribou Anticline, are low grade; up to 3% hydrozincite and smithsonite.

Prospecting Permit 704 is underlain by the Eleanor River, Thumb Mountain, Irene Bay and Cape Phillips Formations. These strata are deformed by a series of north-northwest folds and cut by numerous, similarly trending faults (Figs. 4-10 and 4-11). Both regional and local faults are represented. The oldest and youngest strata exposed are the Eleanor River and Blue Fiord Formations respectively. The Devonian Disappointment Bay Formation unconformably overlies strata in much of the area. This unconformity (Pulse 3 in Table 4-7) is the major unconformity in the Cornwallis Fold Belt and is present near most of the important zinc-lead showings and deposits (Kerr, 1977a, 1977b). Pre-unconformity weathering, solution collapse (sinkholes) and possibly faulting have produced significant relief at the base of the Disappointment Bay Formation.

CURRENT WORK AND RESULTS

In Prospecting Permit 704, modifications were made in the geological map near the old Stuart River camp in the northeast corner of the permit area. The most important new work involved the recognition and mapping of strike-faults that produce repetitive blocks of east-dipping, north-northwest - trending Cliff member of the basal Cape Phillips Formation. As the Devonian Disappointment Bay Formation conglomerates are apparently not affected by these faults, they may have acted as channelways for pre-Disappointment Bay karst processes.

In the Gell River area, west of the old camp, rusty gypsum-calcite-limonite gossans were examined, but zinc-zap and chemical analysis of samples failed to indicate significant metal content.

Work on Permit 704 confirmed that many rocks mapped originally as Thumb Mountain Formation are in fact Bay Fiord Formation. Minor fracture-hosted lead-zinc showings, observed in the vicinity of the Caribou Anticline in 1981 and assigned to the DB chert member of the Thumb Mountain Formation, are now considered to be in the lower-most chert member of the basal Thumb Mountain Formation. These showings are very small and have very little economic potential.

BORDEN BASIN-BORDEN PENINSULA, BAFFIN ISLAND

Borden Peninsula is part of northern Baffin Island and is 500 km north of the Arctic Circle. The area of interest, containing the Society Cliffs Formation, is bounded by the Strathcona Sound and Adams Sound grabens and extends from Admiralty Inlet on the west to Milne Inlet in the east-southeast (Fig. 4-12).

Most of Borden Peninsula is underlain by Neohelikian shales, quartz arenites, greywackes, arkoses, conglomerates and carbonates (Table 4-9). The carbonates commonly contain stromatolites or bioherms or both. About 90-150 m of tholeiitic plateau basalts occur near the base of the sequence. Faulting occurred during deposition that took place in a southeasterly trending rift zone.

A complex assemblage of Aphebian-Archean gneisses is separated from the overlying Neohelikian strata by a nonconformity. A thin regolith is present in a few places on the gneisses, which are commonly stained red for several metres below the nonconformity (Jackson and others, 1978, p. 3).

Mississippi Valley-type zinc-lead deposits occur in the Society Cliffs Formation at Nanisivik, Hawker Creek and elsewhere on Borden Peninsula. The Society Cliffs Formation is characterized by thick to massive beds of regularly laminated, brownish-grey to grey stromatolitic dololutite and dolosiltite. Planar stromatolites are ubiquitous; low domal varieties are common and cabbage-head types are less common (Jackson and others, 1978). Society Cliffs strata are shallow, subtidal to intertidal in origin and a strong, fetid, petroliferous odour is normally given off by freshly broken rock. Dolomite breccia is common and some of this brecciation can be related to early karsting (Olson, 1984; Geldsetzer, 1974 a & b).

Hadrynian diabase intrudes all older rocks in the area and remnants of flat-lying Paleozoic sandstones and dolomite extend onto Borden Peninsula from adjacent parts of Baffin Island.

Papers by Jackson and Iannelli (1981) and Jackson, Iannelli and Tilley (1980) give a recent geological synthesis of the region.

Exploration 1982 - 83:

In 1982 and 1983 mineral exploration of Borden Basin was for Mississippi Valley-type lead-zinc deposits in the Society Cliffs Formation dolomite (Nanisivik Mines Ltd.) and for shale-hosted lead-zinc deposits in the Arctic Bay and Victor Bay Formations (Petro-Canada). Work was more or less restricted to the Nanisivik Mine property (Chapter 2) and the southeasterly trending belt of Uluksan Group and upper Eqalulik Group sediments that bisect Borden Peninsula and Borden Basin; this area extends from Strathcona Sound (Admiralty Inlet) in the northwest to Milne Inlet in the southeast (Fig. 4-12). It corresponds to the central North Baffin Rift Zone of Jackson and Ianelli, 1981.

In 1981, Nanisivik Mines Ltd. began regional exploration of the area using a multi-instrument airborne-geophysical survey to cover the Society Cliffs Formation. They obtained 14 Prospecting Permits in February,1982 to protect areas of interest (Gibbins, 1984, p.87-90). A Petro-Canada subsidiary, 103912 Canada Inc., obtained 12 Prospecting Permits (957-968) in 1983 (Fig. 4-13).

Nanisivik Mines Ltd. had large programs with estimated exploration expenditures of 1.8 million dollars in 1982 and 0.9 million dollars in 1983. However, Petro-Canada's effort was restricted to about one month of work near the end of the 1983 field season.

No work was done on Nanisivik Mines Ltd.'s Milne Inlet Prospecting Permits (891-893 and 897-899). These permits were relinquished in 1983. The results of previous mineral exploration in the Borden Peninsula area are summarized by Gibbins (1984).

Nanisivik Mines Ltd.'s 1982-83 exploration efforts were rewarded by the discovery of 348,000 tonnes of probable ore, grading 13.7% zinc and 2.4% lead. This new zone is in the southeastern part of the mining lease and is called 'area 14' (See chapter 2).

PROSPECTING PERMITS 890, 894 and 895

Nanisivik Mines Ltd.	Zinc, Lead
401, 44 Victoria St.	48 A/6,10
Toronto, Ont., M5C 1Y2	72°30'N,82°15'W

REFERENCES

Blackadar and others (1968a); Gibbins (1984); Jackson and others (1978, 1980); Jackson and Iannelli (1981); Laporte (1974a).

DIAND assessment report 081723.

PROPERTY

Prospecting Permit 890	48 A/10 SW
Prospecting Permit 894	48 A/6 NE
Prospecting Permit 895	48 A/6 NW
Includes:	
BERT claim	48 A/6
ROB 1 claim	48 A/6,11

LOCATION

The permits are near the southeast corner of Borden Peninsula, just north of the Magda icefield. The permit areas are 80 to 110 km southeast of Nanisivik and 30 to 60 km west of Tremblay Sound (Fig. 4-13).

HISTORY

In 1981, Nanisivik Mines Ltd. contracted Aerodat Ltd. to fly 5,352 line km of helicopter-borne magnetic, electromagnetic and VLF-EM survey and Paterson, Grant and Watson Ltd. to compile and interpret this data. Some 150 EM and VLF-EM conductors were identified as probably of bedrock origin and 74 of these were recommended for further investigation (Gibbins, 1984).

Nanisivik Mines took out Prospecting Permits 890, 894 and 895 in February,1982. The ROB 1 claim was staked in April,1981 and the BERT 1 in October, 1981 (Gibbins, 1984). Early (1969-1970) exploration in the area is discussed in Laporte (1974a, p.144-151).

DESCRIPTION

The permits are in the central part of the Central Borden Rift Zone (Jackson and others, 1978, 1980 and Jackson and Iannelli, 1981). The rift zone contains most of the Helikian Society Cliffs Formation outcroppings in the region.

CURRENT WORK AND RESULTS

Anomalies identified by the 1981 airborne geophysical surveys were identified, gridded, mapped, and tested with ground VLF and magnetometer surveys. Soil samples were collected and analyzed for lead,

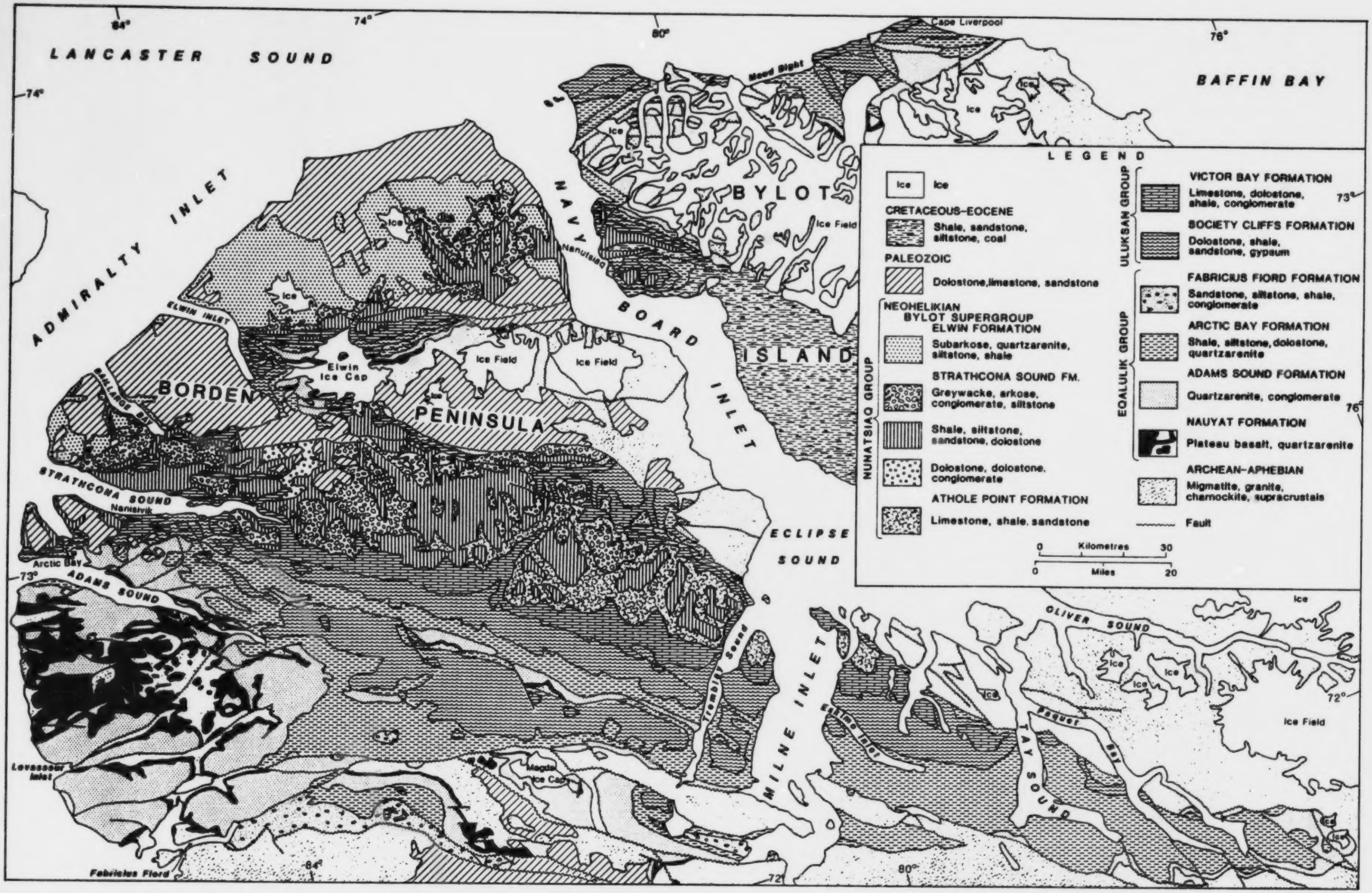
LANCASTER SOUND
BAFFIN BAY
ADMIRALTY INLET
NAVY BOARD INLET
BYLOT ISLAND
BORDEN PENINSULA
ECLIPSE SOUND
MILNE INLET
OLIVER SOUND
TAY SOUND
STRATHCONA SOUND
ADAMS SOUND
ELWIN INLET
Elwin Ice Cap
Ice Field
Ice
Cape Liverpool
Maud Bight
Nanisivik
Arctic Bay
Levasseur Inlet
Fabricius Fiord
Tremblay Sound
Eskimo Inlet
Paquet Bay
84°
74°
80°
76°
73°
72°
LEGEND
Ice
CRETACEOUS–EOCENE
Shale, sandstone, siltstone, coal
PALEOZOIC
Dolostone, limestone, sandstone
NEOHELIKIAN
BYLOT SUPERGROUP
ELWIN FORMATION
Subarkose, quartzarenite, siltstone, shale
STRATHCONA SOUND FM.
Greywacke, arkose, conglomerate, siltstone
Shale, siltstone, sandstone, dolostone
Dolostone, dolostone, conglomerate
ATHOLE POINT FORMATION
Limestone, shale, sandstone
NUNATSIAQ GROUP
ULUKSAN GROUP
VICTOR BAY FORMATION
Limestone, dolostone, shale, conglomerate
SOCIETY CLIFFS FORMATION
Dolostone, shale, sandstone, gypsum
EQALULIK GROUP
FABRICIUS FIORD FORMATION
Sandstone, siltstone, shale, conglomerate
ARCTIC BAY FORMATION
Shale, siltstone, dolostone, quartzarenite
ADAMS SOUND FORMATION
Quartzarenite, conglomerate
NAUYAT FORMATION
Plateau basalt, quartzarenite
ARCHEAN–APHEBIAN
Migmatite, granite, charnockite, supracrustals
Fault
0 Kilometres 30
0 Miles 20

FIGURE 4-12: Geology of the Borden Basin (from Jackson and Iannelli, 1981)

zinc and copper. Where warranted, a Max-Min II HLEM survey was used to define conductors in more detail. A pilot reconnaissance geochemical stream-sediment survey was undertaken in the area of the BERT claim.

Prospecting Permit 895:

Anomaly 3-B3-21 represents a weak airborne VLF-EM anomaly 3 km east of the BERT claim. About 2 percent of the gridded area is outcrop of flat-lying dolomite of the Society Cliffs Formation. The rest of the area is soil, talus and boulders. Disseminated galena was found just west of the grid in an area underlain by altered dolomite. Ground VLF, HLEM and magnetometer surveys did not yield strong responses. One northwesterly trending gabbro dike was interpreted from the magnetic data.

Anomaly 3-B3-17 is 1.5 km north of the BERT claim. The grid is underlain by shale of the Arctic Bay Formation and includes two north-northwesterly trending gabbro dikes. The magnetic data and one small anomaly in the Fraser filter data correspond to this gabbro dike. The soil geochemical data show several high copper anomalies, but these were collected near the gabbro dike and probably related to it.

Stream-sediment sampling in 1983 revealed two main anomalies: north of the BERT claim and north of Magda Lake, although the latter is high in copper as well as zinc and may indicate a dike provenance.

Prospecting Permit 894:

Permit 894 is directly east of Permit 895. Magda Lake is in its southwest corner. Society Cliffs Formation dolostone and underlying Arctic Bay Formation shale are exposed over the northern two-thirds of the area. Aphebian basement gneiss and Adams Sound Formation quartzite occur south of the Magda Lake drainage, which marks a major regional westerly striking fault. Disseminated sulphides are associated with the dolostone-shale contact, but no economic concentrations are known.

No ground follow-up has been done on any airborne anomalies in the permit area.

About one third of the regional stream sediment sample survey was conducted on Permit 894.

Prospecting Permit 890:

Society Cliffs Formation dolostone crosses the area in a belt of outcrop that extends through the northwest and southeast corners. It is underlain to the southwest by Arctic Bay Formation shale and overlain to the northeast by Victor Bay Formation shale. No mineralization is known.

No ground follow-up has been done as the permit is north of the area covered by the aerial geophysical survey.

BERT CLAIM

Nanisivik Mines Ltd.	Lead, Zinc
401, 44 Victoria St.	48 A/6
Toronto, Ont., M5C 1Y2	72°28'N,82°45'W

REFERENCES

Gibbins (1984); Jackson and Iannelli (1981); Laporte (1974a); Padgham and others (1978).

DIAND assessment report 081710.

PROPERTY

BERT claim

LOCATION

The BERT claim is located about 83 km southeast of Nanisivik (Fig. 4-13). A small airstrip at Magda Lake is 15 km to the southeast. However, it becomes muddy early in the summer.

HISTORY

The BERT claim was recorded October 1, 1981, to protect mineral rights in an area over which was recorded a strong EM anomaly discovered during the 1981 reconnaissance airborne geophysical survey (Gibbins, 1984). Galena and lesser amounts of sphalerite were observed in float and overburden found on the claim.

Geologists working for King Resources Ltd. explored the Magda Lake region between 1970 and 1973 (Laporte, 1974a; Padgham and others, 1978), but apparently did not find the showing or EM conductor.

DESCRIPTION

The BERT claim is in the Borden Basin, an aulacogen-like structure which evolved within the North Borden Rift Zone (Jackson and Iannelli, 1981).

The majority of the claim area is underlain by fine-grained black fissile shales of the Arctic Bay Formation. These are locally overlain by dolostones of the Society Cliffs Formation. These formations are cut by two phases of fault-controlled dike swarms; an older E-W Borden dike swarm and a younger NW-SE Franklin dike swarm (Jackson and Iannelli, 1981).

CURRENT WORK AND RESULTS

1982

Geological mapping and prospecting revealed

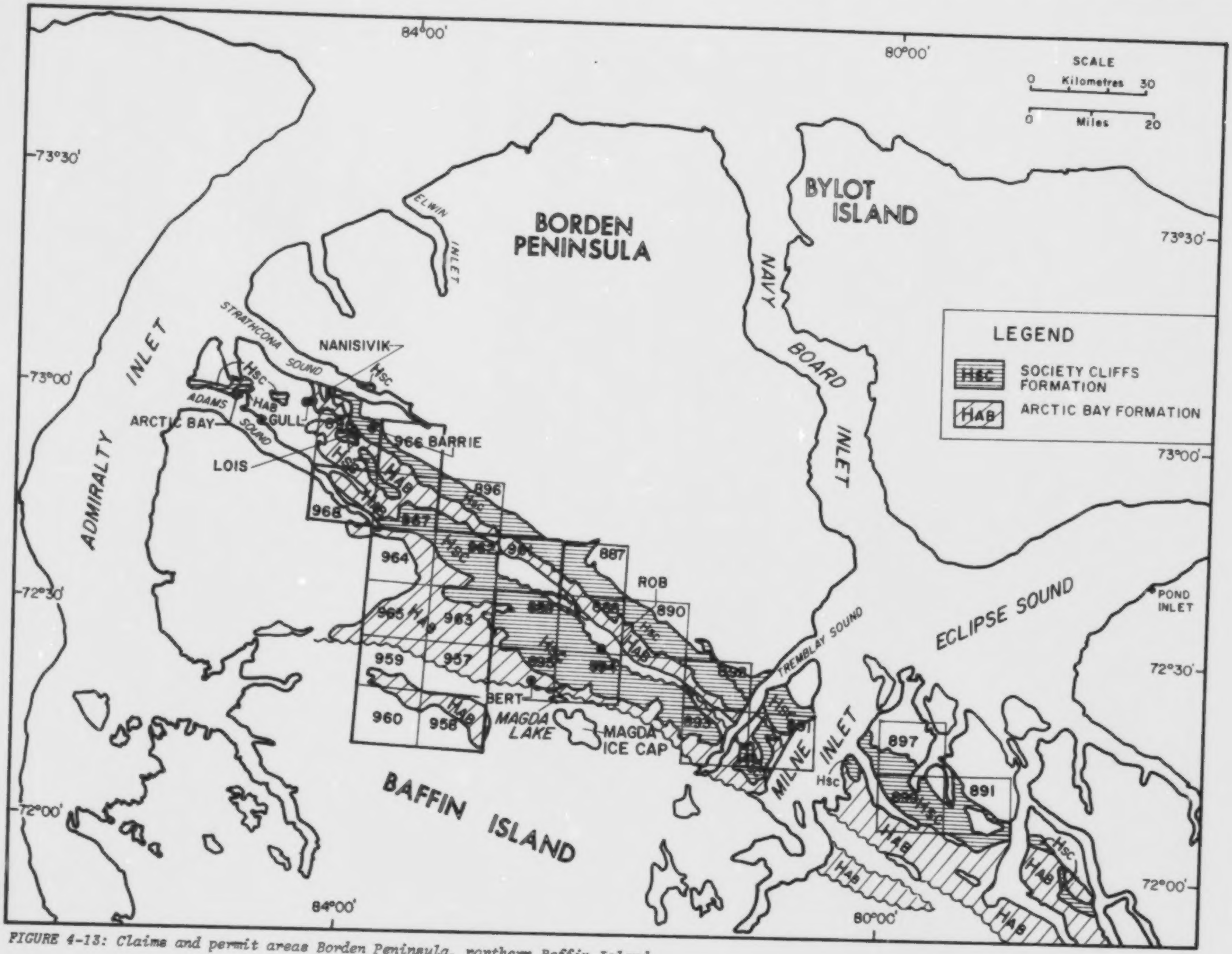
SCALE
0 Kilometres 30
0 Miles 20
LEGEND
Hsc SOCIETY CLIFFS FORMATION
HAB ARCTIC BAY FORMATION
BYLOT ISLAND
BORDEN PENINSULA
BAFFIN ISLAND
NAVY BOARD INLET
ECLIPSE SOUND
POND INLET
TREMBLAY SOUND
MILNE INLET
ADMIRALTY INLET
ELWIN INLET
STRATHCONA SOUND
ADAMS SOUND
NANISIVIK
ARCTIC BAY
GULL
LOIS
BARRIE
ROB
BERT
MAGDA LAKE
MAGDA ICE CAP
966
896
968
887
964
965
963
959
957
960
958
890
897
891
Hsc
HAB
84°00'
80°00'
73°30'
73°00'
72°30'
72°00'

FIGURE 4-13: Claims and permit areas Borden Peninsula, northern Baffin Island

sulphide minerals in several distinct areas. The commonest showings are dike-or contact-controlled. Massive galena and sphalerite are found in gossanous 'sandy' dolostone float of the basal part of the Society Cliffs Formation; assays in excess of 65% combined lead and zinc were obtained. Minor fracture fillings of yellowish sphalerite, galena, and smithsonite in the interbedded sandy and massive unit have been noted with assays up to 3.5% combined lead-zinc. Near the main dike on the north grid, minor pyrite with sphalerite in 'cooked' dolostone float assaying up to 36% Zn has been noted. Hematite after pyrite has been observed throughout the Society Cliffs Formation sequence in varying amounts. Magnetite veins to cm scale occur in one locality in a 'bleached' dolostone on the contact with the northernmost gabbro dike.

A regional geochemical soil sampling survey at 25 m intervals outlined four zones of anomalous lead and zinc. The first appears to represent downslope transport or mineralized 'sandy' float from the Arctic Bay/Society Cliffs contact. The second zone appears to be related to more massive strata with Pb-Zn fracture fillings higher in the Society Cliffs Formation sequence. The third zone may also represent migration of mineralized float from the Arctic Bay/Society Cliffs contact, while the fourth zone appears to be dike related.

Magnetometer and VLF-EM surveys of the total grid area outlined gabbro dikes. The VLF Fraser filter contours outlined narrow zones believed to represent the Arctic Bay Formation/Society Cliffs Formation contact near the center of the claim.

Neither the VLF nor the Max-Min EM surveys explain the amount of mineralized float observed. An IP survey showed broad, medium-strength anomalies.

1983

Additional geological mapping and IP work was completed in 1983. The results of the exploration done to date suggest that the Pb-Zn minerals are localized near the Society Cliffs/Arctic Bay contact with some possible migration into fracture fillings in overlying more massive dolostone units.

PROSPECTING PERMITS 886-889

Nanisivik Mines Ltd.	Zinc, Lead
401, 44 Victoria St.	48 A/11,13
Toronto, Ont., M5C 1Y2	72°30'-72°53'N
	82°-83°30'W

REFERENCES

Gibbins (1983a, 1984); Jackson and others (1978, 1980); Jackson and Iannelli (1981); Laporte (1974a); Olson (1977).

DIAND assessment report 081722.

PROPERTY

Prospecting Permit 886	48 A/13 SE
Prospecting Permit 887	48 A/11 NE
Prospecting Permit 888	48 A/11 SE
Prospecting Permit 889	48 A/11 SW
ROB claim	48 A/11 SE

LOCATION

Prospecting Permit 886 is centered 48 km east-southeast of the Nanisivik mine. The Adams River runs northwesterly through the permit area from its southeast corner. A small airstrip lies near the center of the permit area on the northeast side of the Adams River.

The Hawker Creek pyrite-sphalerite-galena showings (Gibbins, 1983a, p.28-30) are centered near the northwest corner of Permit 886.

Prospecting Permit 887 is centered 83 km east-southeast of Nanisivik at the headwaters of the Alpha River. Permit 888 adjoins the southern boundary of Prospecting Permit 887, 17 km north of Magda Lake, and includes most of the ROB claim (Gibbins, 1984, p.89). Prospecting Permit 889 adjoins the west boundary of Prospecting Permit 888 (Figure 4-13).

HISTORY

The area has been explored for Nanisivik-type ore deposits since 1963 (Laporte, 1974a). Most of this work was done for King Resources Ltd. and its successor Global Arctic Islands Ltd. by Trigg Woollett Consulting Ltd.. Olson (1977) discussed the results of exploration in the Hawker Creek, Adams River and Surprise Creek areas, which fall in or adjacent to the permit areas.

Prospecting Permits 886-889 are four of the fourteen permits obtained by Nanisivik Mines Ltd. in February, 1982, to protect outcrop areas of Society Cliffs Formation and anomalies recognized by the 1981 Aerodat Ltd. reconnaissance airborne geophysical survey (Gibbins, 1984, p.86).

DESCRIPTION

The permits are in the central part of the Central Borden Rift Zone of the Borden Basin (Jackson and others, 1978, 1980; Jackson and Iannelli, 1981).

This rift zone contains most of the outcrop of Society Cliffs Formation dolomite, which is the host rock of the ore at the Nanisivik mine.

Several airborne-detected geophysical anomalies (EM conductors) occur near the center of Prospecting Permit 886 (2-B2-2,4,5,5A and 7) and one near the center of the southeast quarter (2-B2-11). Two other anomalies (3-B3-11 and 4-B3-12) are found just north of the southern boundary of Prospecting Permit 889.

The northeast half and southeast corner of Prospecting Permit 886 is underlain by northwesterly trending belts of Society Cliffs Formation dolomite (Figures 4-12 and 4-13). These belts form topographic highs that are separated by the valley of the Adams River, which extends from the southeast corner to the mid-point of the western boundary of Prospecting Permit 886 and is underlain by Arctic Bay Formation shales. The northeastern belt of Society Cliffs Formation cuts diagonally across Prospecting Permit 887, from northwest to southeast, and the northeastern corner of Prospecting Permit 888. The southern belt of Society Cliffs Formation is present in most of Prospecting Permit 889 and the southwest quarter of Prospecting Permit 888.

CURRENT WORK AND RESULTS

A number of airborne geophysical anomalies were ground checked in 1982. In most cases areas of interest were gridded, prospected, geologically mapped, and surveyed by geophysical (VLF - EM and magnetometer) and geochemical techniques (copper, lead and zinc analysis of soil samples). A limited amount of IP work was done on selected grids in 1983.

All but Prospecting Permit 886 were relinquished at the end of 1983.

Prospecting Permit 886:

Several Aerodat anomalies were identified in the center of Permit 886, northeast and east of the Adams River airstrip. These targets were given the highest priority following the 1981 airborne survey, as they appeared to fall in areas of Society Cliffs Formation dolomite and possess characteristics, including conductance, consistent with the Nanisivik deposit.

The 1982 work showed that the gridded area in the center of the permit is underlain by a conformable sequence of Arctic Bay Formation shales and overlying Society Cliffs Formation dolomite and siliciclastics. These rocks are flat lying; dips are less than 10 degrees. An assumed northwesterly trending fault marks the southern boundary of the grid, with gabbro dikes filling subsidiary, parallel structures. A second set of faults trends northeasterly and offsets some of the dikes.

Lead or zinc minerals were not found in the massive or algal dolostones or clastic rocks. However, limonite-goethite boulders and cobbles were found in areas of gossanous soils, and one thin seam of pyrite was found in Arctic Bay Formation shale.

Lead and zinc geochemical anomalies were found to be closely associated with the basal Society Cliffs Formation dolomite and/or the shale-dolomite contact. On the other hand, copper anomalies tend to be related to gabbro dikes. Most magnetic highs and VLF and Max-Min EM conductors are coincident with or flank gabbro dikes, with the most conductive segments in areas underlain by Arctic Bay Formation shales.

In July, 1983, an IP chargeability/resistivity survey was conducted over the central part of the grid. A couple of areas with coincident IP, EM and zinc anomalies were recommended for drill testing.

An airborne geophysical anomaly (2-B2-11) near the center of the southeast quarter of Permit 886 was gridded, mapped and sampled. Massive, brecciated dolomites of the Society Cliffs Formation have been intruded by a northwesterly trending gabbro dike just south of the baseline. A steel-blue altered zone, produced by the intrusion, is present along the dike margin in much of the area. Four gossan zones were discovered, including one in the altered zone. "Geochemical results included spot highs, but generally low results for copper, lead and zinc, even in the gossan zones". No economic base metal sulphides were found within the gossans, however, two showings of galena and sphalerite were found in association with secondary dolomite as fracture fillings (DIAND assessment report 081722).

Four magnetic highs correspond to a gabbro dike, two spot highs and an unexplained feature. One VLF-EM conductive zone corresponds to the gabbro dike and a second zone may be related to topographic features and or underlying shales.

Prospecting Permits 887 and 888:

All of Permit 887 and the northeast half of Permit 888 lie outside of the area of the 1981 airborne geophysical survey and no physical exploration work has been done in either permit area.

A faulted inlier of Adams Sound Formation quartzite with Nauyat Formation basalt and Aphebian basement gneiss is exposed north of Surprise Creek, which flows along the southern boundary of Permit 888. Disseminated galena and sphalerite have been observed in fracture fillings on the ROB claim (Gibbins, 1984) and minor chalcopyrite has been observed in drill core.

Prospecting Permit 889:

The permit area is almost entirely underlain by Society Cliffs Formation dolomite. A small area of Victor Bay Formation shale is exposed in the northeast corner. Several prominent west-northwesterly striking gabbro dikes cut across the area and are associated with numerous low priority airborne-detected anomalies. No base metal sulphides have been found in the permit area.

Aerodat anomalies 3-B3-11 and 4-B3-12 are contained in a small gridded area, just north of the western half of the south boundary of Permit 889 a few km northwest of the BERT claim. This area is mainly felsenmeer of Arctic Bay Formation shale, with some Society Cliffs Formation dolomite in the northwest corner. The magnetometer survey of this area outlined two gabbro dikes. A third dike is relatively non-magnetic. Moderate Fraser filter VLF EM anomalies flank gabbro dikes, with the exception of a conductor, that corresponds to the dolomite-shale contact. The most striking result of the soil geochemical survey is the enrichment of lead and zinc along the dolomite-shale contact.

In 1983 a regional stream sediment sampling program in the BERT claim - Magda Lake area included some of Permit 889. No anomalies were found on the permit.

PROSPECTING PERMIT 896

Nanisivik Mines Ltd.	Zinc, Lead
401, 44 Victoria St.	48 B/16
Toronto, Ont., M5C 1Y2	72°55'N,84°15'W

REFERENCES

Blackadar and others (1968d); Clayton and Thorpe (1982); Gibbins (1984); Jackson and Iannelli (1981).

DIAND assessment report 081742.

PROPERTY

Prospecting Permit 896	48 B/16 NE
LOIS Claim	

LOCATION

The permit is adjacent to the Nanisivik mineral leases and is centered about 14 km southeast of the mine. The LOIS claim is in the southeast quadrant of the permit area.

HISTORY

In 1981 Nanisivik Mines Ltd. undertook a reconnaissance airborne geophysical survey of the two principal outcrop belts of Society Cliffs Formation dolomite on Borden Peninsula (Gibbins, 1984). This survey was flown by Aerodat Ltd. of Toronto to discover massive sulfide deposits of the Nanisivik-type. In February ,1982, Nanisivik Mines Ltd. obtained 14 prospecting permits (including Permit 896), on the basis of the compilation and interpretation of this survey and published geological maps (Blackadar and others, 1968d).

DESCRIPTION

The permit area is underlain by strata of the Eqalulik and Uluksan Groups (Bylot Supergroup of Jackson and Iannelli, 1981). Two belts of Society Cliffs Formation dolomite cut across the northeast half of the permit. The northeastern belt is continuous with the rocks that host the Nanisivik deposits, while the southwest belt is much thinner and discontinuous. This belt is mainly exposed in mesas, surrounded by valleys with floors and walls of Arctic Bay Formation shales.

Adams Sound Formation quartzite covers much of the southwest half of the area (Fig. 4-12 and 4-13 and Blackadar, 1968d).

The only known sulphide showing in Permit 886 is massive to disseminated pyrite associated with faulting near the northern boundary of the permit and possibly related to the South Boundary Zone pyrite at Nanisivik (Clayton and Thorpe, 1982 and Chapter 2).

CURRENT WORK AND RESULTS

The Aerodat Ltd. survey revealed two conductors in the permit area in addition to those on the LOIS claims: Anomaly 6-B1-1 in the north central part of the permit and Anomaly 1-B1-4 just north of its center.

Aerodat conductor 6-B1-1 was found to be coincident with a small lake-filled valley adjacent to a major northwest-trending graben system. The conductor area was gridded and shown to be underlain by fissile black shales of the Arctic Bay Formation. Hematite-stained dolomite of the Society Cliffs Formation rests conformably on the shales to the south. A moderate VLF conductor beneath the lake corresponds to the airborne conductor and is probably caused by conductive lake sediments. No magnetic anomalies were obtained.

The geological and geophysical surveys failed to reveal the cause of anomaly 1-B1-4, a strong Aerodat anomaly. Results of a soil geochemical survey were not encouraging.

A regional mapping and soil geochemical program revealed two areas of anomalous lead and zinc, which should be checked by VLF-EM.

The permit was relinquished at the end of 1983.

LOIS CLAIM

Nanisivik Mines Ltd.	Gold, Copper
401, 44 Victoria St.	48 B/16
Toronto, Ont., M5C 1Y2	72°55'N,84°08'W

REFERENCES

Blackadar and others (1968d); Gibbins (1984); Jackson and Iannelli (1981).

DIAND assessment report 081695.

LOCATION

The LOIS claim is 20 km southeast of Nanisivik (Fig. 4-13).

HISTORY

An airborne geophysical survey done for Nanisivik Mines Ltd. identified a strong conductive anomaly adjacent to a gabbro dike. Dike related anomalies are common in the region and it was decided to study one of these anomalies in detail. Consequently, the LOIS claim was recorded in October,1981.

DESCRIPTION

The area is situated in a portion of the Borden Basin which evolved within the North Baffin Rift Zone (Jackson and Iannelli, 1981). Strata in the area of the claim are mainly fine-grained black fissile shales of the Arctic Bay Formation. These are overlain by algal laminated and massive dolostones of the Society Cliffs Formation (Blackadar and others, 1968d). All these formations are cut by two phases of fault-controlled dikes, an older E-W Borden dike swarm and a younger NW-SE Franklin dike swarm.

CURRENT WORK AND RESULTS

Geology:

The Arctic Bay Formation, which consists of fissile black to locally graphitic shales and dolomitic shales and siltstones, is the only formation observed. This is intruded by a large westerly striking differentiated gabbro dike and a subsidiary dike located 350 m south. The main dike appears to consist of a medium-grained pinkish syenitic core flanked by a coarser and earlier green gabbroic phase, although contacts are indistinct and probably gradational. Thermal alteration along the margins has resulted in the formation of graphitic shales. Quartz carbonate stringers were found in the dike rocks with preference apparently for the syenitic phase, although they were also discovered in blocks of green gabbro. They vary up to 2.5 cm in width and contain chalcopyrite in places. One specimen assayed 5.68% Cu and 0.205 g/tonne Au.

Geophysical Surveys:

Magnetometer Survey: a magnetometer survey was carried out by taking readings at 25-metre intervals along a grid using a Geometrics G-846 Unimag II. Two major parallel magnetic trends (anomalies A and B) transect the grid from west to southeast. These strongly magnetic narrow zones averaged greater than 1500 gammas above background (58000 gammas) over their entire length. In relation to the geology they represent the magnetic expression of the gray-green blackish phase of the main gabbroic dike. The magnetic response would be due to the higher than average magnetic content in these rocks in comparison to the inner syenitic core where the magnetic data reveal a relative low with values ranging between 500 and 1000 gammas.

VLF-EM Survey: two separate VLF-EM surveys were conducted over grids. The first was completed over cross lines 200 metres apart while the second was over 50-metre lines on a small section of the western part of the grid. The aerodat survey delineated four conductors of merit. In the region of the follow-up work the conductors defined a distinct and sharp flexure not repeated over the remaining gridded area. An obvious interpretation would be faulting of the underlying strata, however, the magnetic data do not support this theory.

Max-Min: a survey with a Max-Min II unit using 100-metre and 150-metre cables at 1777 and 888 cps frequencies was carried out over portions of the grid containing the most favourable VLF-EM conductors. Both frequencies and cable lengths gave a strong electromagnetic response indicating near-surface sources over a well defined length of 1600 metres.

Induced Polarization: an IP survey was conducted on three lines parallel to the base line to try and detect anomalies corresponding to the Cu-rich quartz carbonate veinlet system previously discovered in float. However, because of the disseminated magnetite associated with the gabbroic phase the results were inconclusive.

Geochemistry:

Soil development is poor in the grid area but soil samples collected at 25-metre intervals showed slightly anomalous Cu, Pb and/or Zn contents along the flanks of dikes and in erratic spot highs.

Conclusion:

It was recommended that the copper showing should be drilled and the syenitic core of the dike be prospected.

GULL & DEB CLAIMS

Nanisivik Mines Ltd.	Zinc, Lead
401, 44 Victoria St.	48 C/1
Toronto, Ont., M5C 1Y2	73°02'N,80°36'W

REFERENCES

Blackadar and others (1968c); Geldsetzer (1973a, 1973b); Gibbins (1984; Gibbins and others (1977); Jackson and others (1978); Lemon and Blackadar (1963).

DIAND assessment reports: 081537 (1982); 081692 (1983).

PROPERTY

GULL 1-35, DEB 1.

LOCATION

The claims are about 1.5 km south of Strathcona Sound on northern Baffin Island. They are immediately west of the Nanisivik mineral lease and 2-4 km west and northwest of the Nanisivik townsite.

HISTORY

The GULL claims were staked in 1972 to protect possible westward extensions of the Nanisivik deposit. Geological and VLF-EM surveys were done on the claims in 1974 (Gibbins and others, 1977). In 1976 a McPhar SS-15 system (vertical loop EM) detected several weak, unexplained anomalies.

In 1981, a geophysical survey, consisting of magnetic, coplanar and coaxial EM and two channels of VLF-EM, was flown at 400 m line spacings with the EM boom at 30 m height (Gibbins, 1984).

The target zone in the upper Society Cliffs Formation appears to be too deep for the airborne EM system to reach.

The DEB claim was staked in the spring of 1982.

DESCRIPTION

The region is underlain by a sequence of Helikian sediments that are generally flat lying but commonly block faulted. The most recent regional geological maps are those of Blackadar and others (1968c) and Lemon and Blackadar (1963). However, the Geological Survey of Canada has done additional mapping in the area since 1977 (Jackson and others, 1978).

The GULL claims are underlain by dolomitic shales of the lower Victor Bay Formation and dolomite of the middle Victor Bay Formation. Society Cliffs Formation dolomite, which normally underlies the Victor Bay Formation and contains the lead and zinc at Nanisivik (Gibbins and others, 1977), does not outcrop on the claims, but geological mapping and drilling to the east of the claims suggest it is present at a depth greater than 120 m. Almost 450 m of Society Cliffs Formation has been measured in the region, thus it should occur on the claims at depths between 120 and 670 m, however, extensive pre-Victor Bay karsting in the area (Geldsetzer, 1973a, 1973b) may have removed some of the Society Cliffs Formation.

Northwest-trending diabase-gabbro dikes intrude the Victor Bay and Strathcona Sound Formations in adjacent areas.

CURRENT WORK AND RESULTS

1982:

A VLF-EM survey, on Grid 82-1 along the southern boundary of the GULL claims and the DEB claim, detected moderate responses consistent with conductive overburden.

VLF-EM, Max-Min EM, IP and magnetometer surveys on the DEB and the southeast corner of the GULL claims were designed to check for possible extensions of a good conductor located just east of the GULL claims on the RAVEN claims. The results were consistent with shallow conductive overburden. The magnetometer survey did not indicate any magnetic bodies (i.e. gabbro dikes).

Exploration on the nearby RAVEN claims led to discovery of dolostone of the Society Cliffs Formation in the southeast corner of the GULL claim group. This indicated that the southern part of the group probably has only a thin cover of shale and glacial drift and may be considered for exploration for massive sulphides within the Society Cliffs Formation.

1983:

Because of the favorable location and geology, Turam and IP surveys of the DEB claim and the adjacent RAVEN claims were extended into the GULL claims, despite the fact that previous geophysical surveys (VLF and vertical loop EM) did not yield indications of conductive sulfide minerals.

The Turam and IP surveys were done by Rayan Exploration Ltd. and compiled and interpreted by Paterson, Grant and Watson Ltd. Several drill targets were identified on the basis of two or more coincident geophysical anomalies (Turam, VLF, IP and/or resistivity).

The geology of the GULL-DEB-RAVEN area was mapped in September, 1983 by R. von Guttenburg of Metallgesellschaft Canada Ltd.

BARRIE and BIG BARRIE CLAIMS

Nanisivik Mines Ltd.	Zinc, Lead, Copper
401, 44 Victoria St.	48 A/13, B/16
Toronto, Ont., M5C 1Y2	72°59'N,83°59'W

REFERENCES

Blackadar and others (1968a, b); Clayton and Thorpe (1982); Gibbins (1983b, 1984).

DIAND assessment report 081548.

PROPERTY

BARRIE 1, BIG BARRIE

LOCATION

The claim is 28 km due east of the Nanisivik townsite, 8-10 km south of easternmost Strathcona Sound, northern Baffin Island (Fig. 4-13).

HISTORY

High-grade lead-zinc sulphides were reported from the southern part of the present claim in 1958, but the source was not found during subsequent work. In the 1960's, the claim area and the area west of the claim were staked by Texasgulf Inc. They did geological and vertical loop EM surveys and drilled three short holes to test weak anomalies in the southwestern part of the present BARRIE claim, but no sulphides were found.

The BARRIE claim was staked by Nanisivik Mines Ltd. in 1978 to protect a pyrite outcrop. VLF and large loop (McPhar SS-15) EM surveys done during the 1979 and 1980 field seasons outlined a strong VLF anomaly separate from the pyrite body, but no corresponding vertical loop anomaly could be identified (Gibbins, 1983b). The BIG BARRIE claim was staked in 1981, to protect the area immediately west of the BARRIE claim for possible extensions of the conductive zone.

In 1981 2.5 km of VLF surveys outlined strong VLF conductors in the western claim area, where vertical loop EM surveys of 1979 and 1980 failed to identify anomalies. Normally these anomalies would be interpreted as faults or gabbro dikes, however, field evidence makes this unlikely and a series of discontinuous sulphide pods has been suggested. Two lines of radar (electromagnetic reflection) survey were run to test this hypothesis.

Two holes were drilled to test for extensions of the pyrite zone. Only one hole penetrated the Society Cliffs Formation and it intersected several narrow pyrite zones that assayed very low zinc and lead (Gibbins, 1984).

DESCRIPTION

The claim area is underlain by the Helikian Society Cliffs Formation that hosts the Nanisivik lead-zinc deposits 25 km to the west (Clayton and Thorpe, 1982 and Chapter 2). Down-warped shales of the Victor Bay Formation are exposed east of the claim (Blackadar and others, 1968a, b).

Pyrite outcrops in the Society Cliffs Formation in the northeastern part of the claim and sparse, but widespread gossans occur in the southern third of the claim area.

CURRENT WORK AND RESULTS

In August,1982, 12 holes (1,443 m) were drilled to test geophysical anomalies found in the BARRIE claim. Several pyrite intersections and one copper zone (7.4% over 5.5 m) were encountered. However, no mineralized material of economic potential was noted in any of the drilling.

The BIG BARRIE claim has lapsed.

PROSPECTING PERMITS 957-968

Petro-Canada	Lead, Zinc
P.O. Box 2844,	48 A/5,11-13, B/16
Calgary, Alta. T2P 3E3	72°15-45'N,
	82°30'-84°30'W

REFERENCES

Blackadar and others (1968a, d); Gibbins (1984); Jackson and Iannelli (1981); Laporte (1974a, b); Sangster (1981).

PROPERTY

Twelve prospecting permits (957-968) encompassing 279,402 ha.

LOCATION

The permit areas are on the Borden Peninsula, northern Baffin Island, between Arctic Bay and Milne Inlet (Fig. 4-13). They are generally southeast of the head of Adams Sound between longitude 83 and 84 degrees west.

HISTORY

The Geological Survey of Canada mapped the area on a reconnaissance scale (1:253,440) in the 1960's, (Blackadar and others, 1968a, d). Mineral rights to NTS areas 48 A/11-13 and B/16 were previously held by King Resources Ltd. as Prospecting Permits 86-89 between 1969 and 1972, (Laporte 1974a, b).

In 1981 Petro-Canada did lithogeochemical, prospecting and stream sediment sampling surveys in the area. The principle target was clastic and carbonate sediments of the Proterozoic Bylot Supergroup, with emphasis on assessing the metal and uranium content of black shales. No significant mineral occurrences were discovered, however, several sites of high lead and zinc content (6,000 ppm combined) were found in black shales of the Arctic Bay Formation (Gibbins, 1984, p.84).

The permits were obtained in February,1983.

DESCRIPTION

Like most of the southern Borden Basin, the permits are underlain by dark argillaceous carbonate and shale units of the Arctic Bay Formation (Table 4-9). Locally, pyritic shale is the predominant lithology, with siltstone and quartz arenite interbedded with shale in the lower part of the formation, and siltstone, dolostone and quartz arenite interbedded with shale in the upper part (Jackson and Iannelli, 1981).

The formation ranges from 500 to 770 m thick throughout most of the area. The lower contact with the Adams Sound Formation is conformable and gradational. Some shale beds contain concretions and cone-in-cone structures. White gypsum efflorescence and calcareous coatings are common on the shales and some strata emit a strong petroliferous odour.

Jackson and Iannelli (1981) distinguished four intergradational members of the Arctic Bay Formation in the area (Table 4-9). However, the entire formation is distinctly different southeast of Milne Inlet. Planar-laminated micaceous black shale predominates in the AB3 member, which is up to 400 m thick on Borden Peninsula. Jackson and Iannelli (1981, p. 279) interpreted the monotonous black shales of the AB3 member as having accumulated in shallow to deep subtidal to basinal environments.

Sangster (1981) recommended the shales of the Borden Basin and particularly the Arctic Bay Formation shale as a prospective area for shale-hosted stratiform lead-zinc deposits on the basis of geology and by comparison with well-known deposits of this type. He pointed out several impressive, favorable indications in the Borden Basin, namely syn-sedimentary faulting of the Arctic Bay Formation in the North Borden Rift Zone and the possibility of second-order basins the size of individual lead-zinc deposits. He also suggested that at least part of the Borden Basin may be a lead-zinc metallogenic province, as demonstrated by the lead-zinc deposits at Nanisivik.

TABLE 4-9: TABLE OF FORMATIONS, BORDEN BASIN (from Jackson and Iannelli, 1981)

HADRYNIAN			Franklin Intrusions: Diabase	
		GP	Intrusive Contact	
NEOHELIKIAN	BYLOT SUPERGROUP	NUNATSIAQ	Elwin Fm. (470-1220 m):	EL$_1$: Quartzarenite, siltstone EL$_2$: Sandstone, siltstone, dolostone
			Gradational	
			Strathcona Sound Fm: (430-910 m+)	SS$_6$: SS$_{1-5}$ lithologies interbedded SS$_5$: Polymictic conglomerate SS$_4$: Siltstone, greywacke SS$_3$: Arkose-greywacke, shale SS$_2$: Dolostone, dolostone conglomerate SS$_1$: Shale, siltstone
			Gradational	
			Athole Point Fm: (0-585 m) Limestone, sandstone, shale	
			Gradational	Gradational to Unconformable
		ULUKSAN	Victor Bay Fm: (156-735 m)	VB$_2$: Limestone, dolostone, flat pebble conglomerate VB$_1$: Shale, siltstone, sandstone, limestone
			Conformable, Abrupt to Gradational	
			Society Cliffs Fm: (263-856 m)	SC$_2$: Stromatolitic & massive dolostones
			Chiefly Unconformable?	SC$_1$: Stromatolitic dolostone, shale, sandstone, gypsum
		EQALULIK	Fabricius Fiord Fm: (400-2000 m+) FF$_4$: Arkose, conglomerate, dolostone FF$_3$: Subarkose, conglomerate FF$_2$: Shale, quartzarenite FF$_1$: Quartzarenite, shale	Gradational to Unconformable
				Arctic Bay Fm: (180-770 m) AB$_4$: Shale, dolostone AB$_3$: Shale, siltstone AB$_2$: Shale, quartzarenite AB$_1$: Siltstone, quartzarenite
			Conformable, Abrupt to Gradational	
			Adams Sound Fm: (0-610 m) AS$_3$: Quartzarenite, conglomerate, shale AS$_2$: Quartzarenite AS$_1$: Quartzarenite, conglomerate	AS$_U$: Quartzarenite AS$_L$: Quartzarenite, conglomerate
			Conformable	
			Nauyat Fm: (0-430 m)	NA$_2$: Plateau basalt NA$_1$: Quartzarenite, subarkose, basalt
			Nonconformity	
ARCHEAN-APHEBIAN			Granitic gneiss basement complex: Migmatite, foliated granitic rocks, granite, charnockite, supracrustal relics	

CURRENT WORK AND RESULTS

Most of August,1983 was spent exploring areas of Helikian Arctic Bay Formation shales for lead and zinc. Work consisted mainly of prospecting and collecting samples for heavy mineral and lithogeochemical studies. Results were not available at the time of writing.

MELVILLE PENINSULA

Mapping by Heywood (1969 and 1974) and others (Schau, 1984) shows that most of Melville Peninsula is underlain by Archean gneisses, migmatites and foliated to massive granitoid rocks. Among the oldest rocks of the region are folded and metamorphosed sedimentary and volcanic rocks of the Prince Albert Group. These supracrustal rocks are distributed in northeast-trending belts up to 20 km wide and at least 280 km along strike (Shau, 1978). Clastic metasedimentary rocks are mainly derived from greywacke and interbedded with acid to basic metavolcanic rocks and local komatiite or ultrabasics and iron formation.

The iron formation is widespread, thick and extensive (Shau, 1984) and can be readily traced on aeromagnetic maps. It consists mainly of magnetite and quartz with minor pyrite, hematite and carbonate. Some sections average as much as 30% iron. Rusty-weathering zones or gossans, commonly containing disseminated sulphides, are present in many parts of the region. Most are associated with the metavolcanic rocks of the Prince Albert Group.

The iron formation was systematically explored and staked by Borealis Exploration Ltd. in the summers of 1969 and 1970 (Wilson and Underhill, 1971; Laporte, 1974a). Aquitaine Company of Canada Ltd. explored 23 prospecting permits in southern Melville Peninsula in 1970-72 (Laporte, 1974a, b). Cominco Ltd. and Noranda Exploration Ltd. did some mineral exploration on Melville Peninsula in 1979 and 1980 respectively (Gibbins, 1983b and 1984). However, Melville Peninsula has not been the scene of many major mineral exploration projects.

ROCHE BAY IRON DEPOSITS

Borealis Exploration Ltd.	Iron, Gold
940-8th Avenue S.W.	47 A/4-6
Calgary, Alberta, T2P 1G6	68°35'N, 82°48'W

REFERENCES

Gross (1973); Heywood (1967); Laporte (1974a, 1978); Schau (1984); Underhill and Cox (1981); Wilson and Underhill (1971).

PROPERTY

IAN 1-6	47 A/4
DON 1-24	47 A/5, 6
JEF 1-46, LIZ 1-55	47 A/6
BSX 2-25	47 A/6

LOCATION

The claims are west and southwest of Roche Bay, east-central Melville Peninsula, 80-100 km southwest of the nearest community of Hall Beach (6 in Fig. 4-1). The A, B, C, D and E deposits are 10 and 11 km northwest, 10 km west, 16 km west-southwest and 45 km southwest of the mouth of the Ayergotadlik River respectively.

HISTORY

The claims were staked between 1968 and 1970, following the release of government aeromagnetic maps. Reconnaissance and detailed magnetometer and geological surveys, channel and bulk sampling of iron formation were also done at this time.

Nine iron deposits were outlined in the western part of Melville Peninsula and five in the eastern part (Laporte, 1974a). Metallurgical tests indicate that a magnetite concentrate of 68 to 70 percent soluble iron can be produced without the use of flotation cells.

Three sections were channel-sampled in 1975; one 170-m-long section on the IAN claims, one 215-m-long section on the LIN claims and one 430-m-long section on the DUG claims. Analysis of the samples gave results similar to that of the 1969-70 work (Laporte ,1978, p.22).

In 1981 the management of Borealis Exploration Ltd. announced plans to place the eastern Melville Peninsula (Roche Bay) iron deposits into production with the first shipment of ore in 1985 (Underhill and Cox, 1981).

The BSX claims were added in the spring of 1982.

DESCRIPTION

The claims cover parts of a 6 - 11 km wide, 75 km long north-northeast-trending belt of Prince Albert Group metasediments and metavolcanics. Five deposits of iron formation, each at least 125 m wide and over 1,250 m long, were outlined in the main belt and a smaller belt six km to the southeast. The thinly laminated to massive iron formation consists of alternating laminae of magnetite or quartz-magnetite and quartzite.

The Melville Peninsula iron formation is of the 'Algoma type' (Gross, 1973), which is intimately associated with various volcanic rocks including pillowed andesites, tuffs, and pyroclastic rocks and related sedimentary rocks including greywacke, grey-green slate, or black carbonaceous slate. Tuff and fine-grained clastic beds or ferruginous cherts are interbedded in the iron-formation. The associated rocks indicate a eugeosynclinal environment for their deposition because of their close relationship in time and space to volcanic activity.

The regional geology of the Prince Albert Group of Melville Peninsula has been mapped and described by Heywood (1967 and 1984) and Shau (1984). Wilson and Underhill (1971) described the iron deposits. A resource of 1.1 billion tonnes of 25 to 30 percent iron has been estimated for the 5 deposits of eastern Melville Peninsula (Roche Bay area).

CURRENT WORK AND RESULTS

1982:

The A (or Adler) and B deposits were tested with 3,500 m of diamond drilling. About 2 km of strike length was drilled at 600 m or less spacing. One hole was completed in the C deposit. All the core was logged and all iron formation was split and assayed. In addition, a 58.5 tonne bulk sample was collected and shipped out for metallurgical tests. Assays showed that the grade of the C deposit was better than the A and B deposits.

A small geological crew carried out geological and magnetometer surveys and some geotechnical work was started.

1983:

After the Ontario Research Foundation determined the presence of trace amounts of gold and silver in the tailing of the iron formation, the 1982 core was re-logged and additional sections were logged and sent for gold-silver assays. Gold was also indicated in the magnetite concentrate (Skilling's Mining Review - December 10, 1983).

A small geological crew did detailed mapping of the A, B and C deposits and Paleozoic carbonates near Roche Bay during the field season. However, most of the company's effort was directed towards the construction of 11 km of roads and a 30 by 1380 m airstrip suitable for Hercules aircraft.

Several prospecting permits, covering the southwesterly extension of the Prince Albert Group, were obtained by Borealis Exploration Ltd. in February, but it is believed that no work was done on these permits in 1983.

COAL IN THE ARCTIC ISLANDS

Coal was discovered and used by several 19th and early 20th century naval and whaling expeditions to the Arctic Islands. For example: "The coal seam of Watercourse Valley (Northeastern Ellesmere Island) was discovered by members of the Nares expedition (1875-1876) and a small tonnage was mined and used. Subsequent parties also have mined and burned some of the coal." (Christie, 1964, p. 59). Minor quantities of coal have been mined for local use at Hudson's Bay Co. and RCMP posts and Christian missions at Pond Inlet, Northern Baffin Island and at Aklavik and Paulatuk on the NWT mainland.

Arctic coal is found mainly in four stratigraphic units: Eureka Sound Formation (uppermost Cretaceous-Lower Tertiary), Hassel Formation (Middle Cretaceous), Isachesen Formation (Lower Cretaceous) and Heiberg Formation (Upper Triassic-Lower Jurassic). The coal-bearing Eureka Sound Formation is the only unit with major coal resources. Although it is widespread throughout the Arctic Islands, the most promising area is on east-central Axel Heiberg Island and southwestern Ellesmere Island, particularly the Fosheim Peninsula near Eureka (Fig. 4-14). The large inferred coal reserves of this area range in rank from lignite through sub-bituminous to high-volatile bituminous.

In many parts of the Arctic Islands, the lateral continuity of coal seams is clearly visible on the landscape due to the dark colour and prominent, resistant nature of coal relative to the light-coloured and weakly consolidated clastic sediments of the enclosing Eureka Sound Formation. However, measured seam thicknesses may not always be accurate, because of slumping on slopes.

Brief reviews of coal in Northern Canada are given by Woodward (1976) and Allen and Dyson (1976).

The rapidly increasing prices of coal and other fuels in the late 1970's, improvements in technologies of in-situ coal gasification and synfuel processes and a recent publication concerning the coal resources of the Eastern Arctic Archipelago (Bustin, 1980) caused renewed interest in Arctic coal resources. This interest became evident in the spring of 1981, when 145 coal licences covering much of the

Fosheim Peninsula of Ellesmere Island and easternmost Axel Heiberg Island were granted. Petro-Canada obtained 110 coal licences, Gulf Canada Resources Inc. were granted 20 and Utah Mines Ltd. 11. Initial reconnaissance exploration involving mapping, measuring stratigraphic sections and sampling, was completed in 1981 (Gibbins, 1984). Subsequently, Utah Mines Ltd. relinquished four coal licences in the Strathcona Fiord area (157-159 and 162). These areas were then granted to Petro-Canada Exploration Ltd. in May,1982 (Coal Licences 334-337).

Gulf Canada Resources Ltd. relinquished 10 coal licences on Axel Heiburg Island and its two northernmost licences on Fosheim Peninsula (184-185). In August,1983 Petro-Canada was granted 10 coal licences (338-347) in the Stenkul Fiord area of southern Ellesmere Island. By the end of 1983, Gulf Canada Resources Ltd. retained 8 of 20 coal licences, Utah Mines Ltd. retained 7 of 11, and Petro-Canada Exploration Ltd. 31 of 124 (Fig. 4-15). This reduced Petro-Canada's holdings to 461,344 ha from 1,852,814 ha.

A coal licence grants the licensee the exclusive right to prospect for coal within an area designated as one quarter of a mineral claim staking sheet or NTS block for three years, provided the licensee spends in exploration work the amounts of five, ten and twenty cents per acre in the first, second and third years respectively. The Territorial Coal Regulations, which govern coal mining rights in the NWT and Yukon, are expected to be amended in the future.

Prior to April,1981, only 1 of 156 coal licences granted by DIAND pertained to an area in the Arctic Islands. This exception was Coal Licence 2 (NTS 79 D/1 NE,Lougheed Island) granted to King Resources Co. December,1968. However, 155 of 190 coal licences, granted between May,1981 and August,1982, are in the

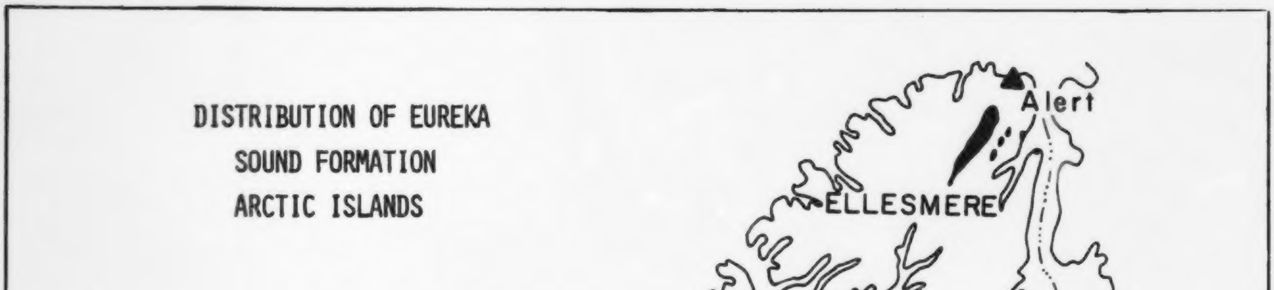

FIGURE 4-14: Distribution of Eureka Sound Formation, Arctic Islands

Arctic Islands, specifically Ellesmere and Axel Heiberg Islands. More than half a million dollars was spent on coal exploration in the Arctic Islands in 1981, more than one million in 1982 and three quarters of a million in 1983.

Petro-Canada was the only company exploring and evaluating coal resources of the Arctic in 1982 and 1983. Field work consisted mainly of prospecting, mapping and measuring, describing and sampling sections of coal-bearing Eureka Sound Formation.

All coal seams with a true thickness greater than 1.0 meter were sampled. Rock splits with a true thickness over 25 centimeters were sampled separately. Due to the numerous seams greater than one meter in some sections, random selections of seams were made from the base to the top of the section due to time and cost restraints. The presence of permafrost less than a half meter below surface made sampling into fresh, unweathered coal seams often difficult. Every coal seam was measured, logged and recorded.

ELLESMERE AND AXEL HEIBERG ISLANDS

Ellesmere and Axel Heiberg Islands of the eastern Canadian Arctic Archipelago are underlain by two major sedimentary basins, the Sverdrup Basin (Fig. 4-16) and the Franklin Basin (Fig. 4-17) (Stuart Smith and Wennekers, 1977 and Thorsteinsson and Tozer, 1970). The Franklin Eugeosyncline was the site of more or less continuous sedimentation between late Precambrian and late Devonian time (Thorsteinsson and Tozer, 1970, p. 551). The most important tectonic event that affected the Franklin Miogeosyncline was the Ellesmerian Orogeny of late Devonian or early Carboniferous age.

The Sverdrup Basin is a successor basin superimposed on the Franklin Geosyncline. It contains an essentially concordant succession up to 13,000 m thick of Lower Carboniferous to Tertiary, marine and nonmarine sedimentary rocks, basalt flows and gabbro dykes and sills (Fig. 4-16). "The basin evolved in five phases: (1) late Paleozoic, when evaporites and marine muds were deposited in the axial region and carbonates and mature sands on the margins; (2) early Mesozoic, when great thicknesses of siltstone and shale accumulated in axial parts of the basin; (3) middle Mesozoic, when terrigenous clastic deposits accumulated slowly; (4) late Mesozoic, when clastic deposits widely overstepped former basin margins; and (5) late Mesozoic-Cenozoic, when the basin underwent several stages of tectonism (Eurekan Orogeny)." (Balkwill, 1978, p. 1004).

During the Eurekan Orogeny, compression was confined to the eastern Arctic, primarily Ellesmere and Axel Heiberg Islands. Elsewhere, the Sverdrup Basin and adjacent areas were disturbed by broad

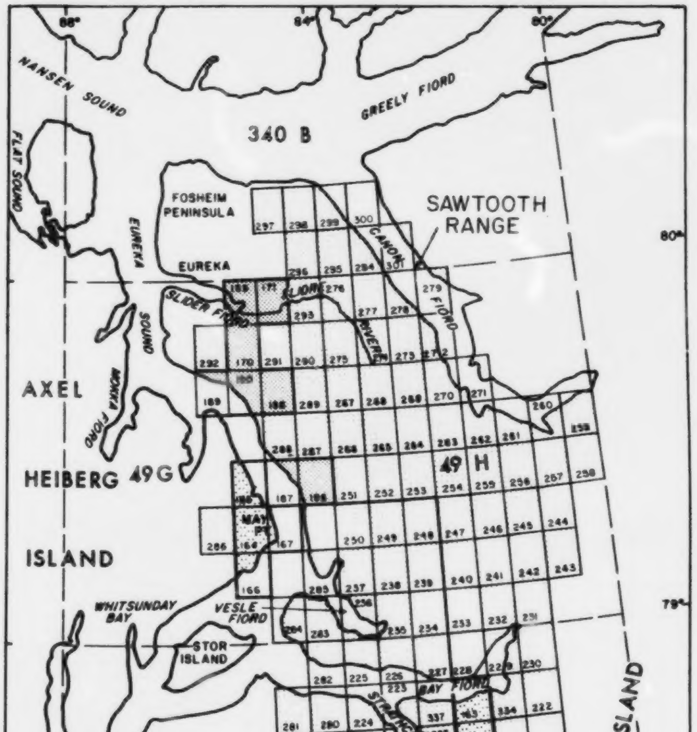
88°
84°
80°
NANSEN SOUND
GREELY FIORD
FLAT SOUND
340 B
FOSHEIM PENINSULA
EUREKA
SAWTOOTH RANGE
CANON FIORD
SLIDRE FIORD
EUREKA SOUND
MOKKA FIORD
AXEL HEIBERG ISLAND
49 G
49 H
MAY PT.
WHITSUNDAY BAY
VESLE FIORD
STOR ISLAND
BAY FIORD
STRATHCONA FIORD
49 F
49 E
RAANES PENINSULA
EUREKA SOUND
ELLESMERE ISLAND
BJORNE PENINSULA
BAUMANN FIORD
49 C
49 D
VESTRE FIORD
STENKUL FIORD
SOR FIORD
OKSE
MAKINSON INLET
80°
79°
78°
77°
PETRO CANADA
GULF CANADA RESOURCES
UTAH MINES
KILOMETRES

FIGURE 4-15: Coal licences, Ellesmere and Axel Heiberg Islands, 1982-83

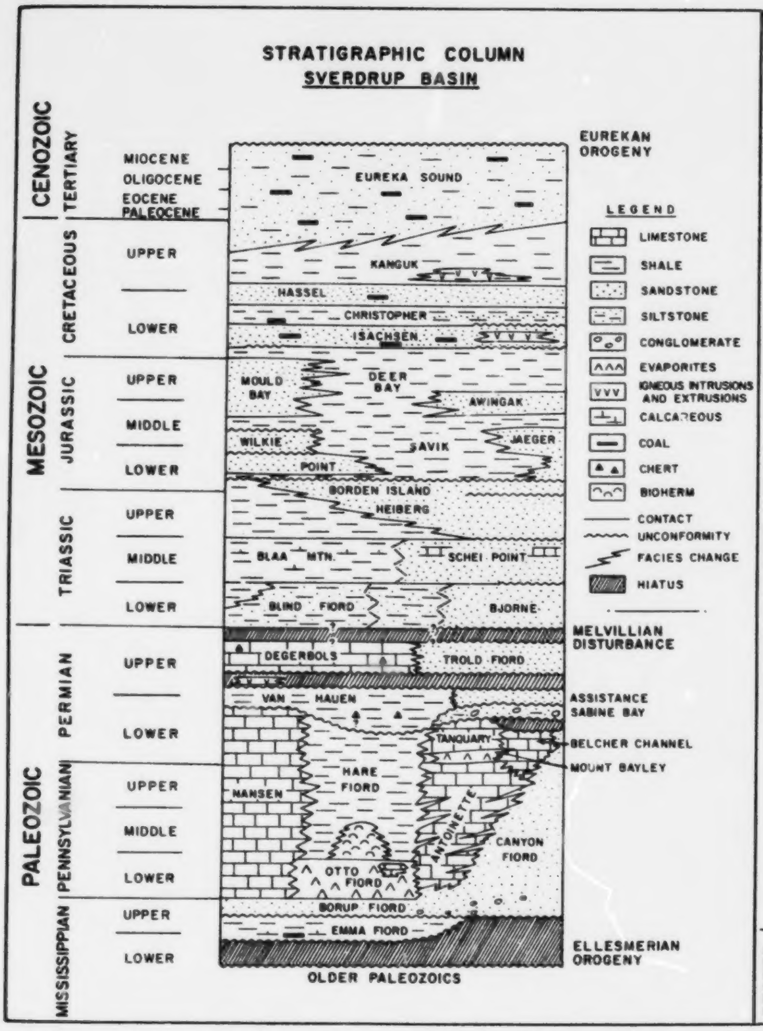
STRATIGRAPHIC COLUMN
SVERDRUP BASIN
CENOZOIC
TERTIARY
MIOCENE
OLIGOCENE
EOCENE
PALEOCENE
EUREKA SOUND
EUREKAN OROGENY
MESOZOIC
CRETACEOUS
UPPER
LOWER
KANGUK
HASSEL
CHRISTOPHER
ISACHSEN
JURASSIC
MIDDLE
MOULD BAY
DEER BAY
AWINGAK
WILKIE
SAVIK
JAEGER
POINT
BORDEN ISLAND
HEIBERG
TRIASSIC
BLAA MTN.
SCHEI POINT
BLIND FIORD
BJORNE
MELVILLIAN DISTURBANCE
PALEOZOIC
PERMIAN
DEGERBOLS
TROLD FIORD
VAN HAUEN
ASSISTANCE
SABINE BAY
TANQUARY
BELCHER CHANNEL
MOUNT BAYLEY
PENNSYLVANIAN
NANSEN
HARE FIORD
ANTOINETTE
CANYON FIORD
OTTO FIORD
MISSISSIPPIAN
BORUP FIORD
EMMA FIORD
ELLESMERIAN OROGENY
OLDER PALEOZOICS
LEGEND
LIMESTONE
SHALE
SANDSTONE
SILTSTONE
CONGLOMERATE
EVAPORITES
IGNEOUS INTRUSIONS AND EXTRUSIONS
CALCAREOUS
COAL
CHERT
BIOHERM
CONTACT
UNCONFORMITY
FACIES CHANGE
HIATUS

FIGURE 4-16: Stratigraphic column Sverdrup Basin (from Stuart Smith and Wennekers, 1977)

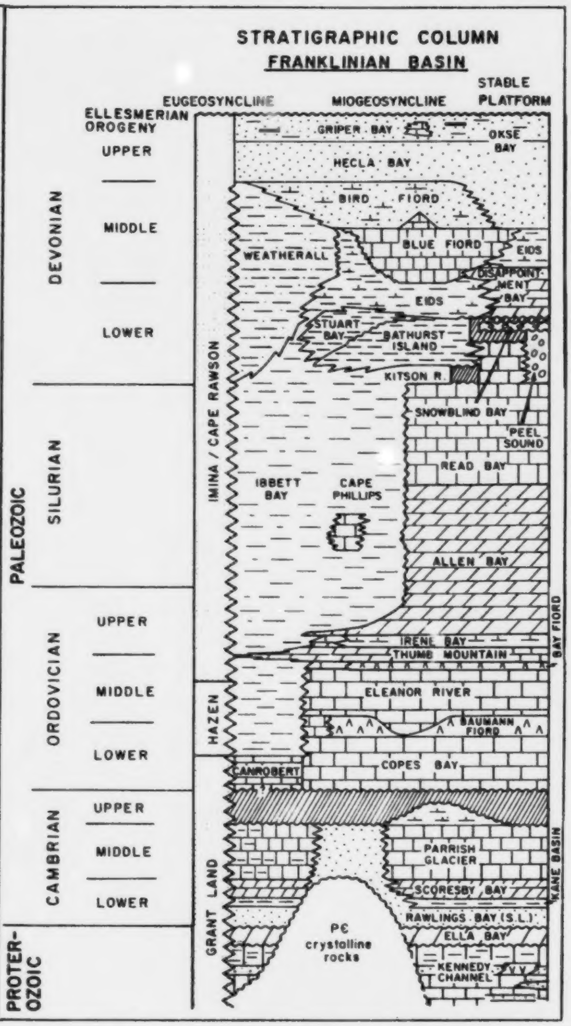
STRATIGRAPHIC COLUMN
FRANKLINIAN BASIN
EUGEOSYNCLINE
MIOGEOSYNCLINE
STABLE PLATFORM
ELLESMERIAN OROGENY
PALEOZOIC
DEVONIAN
UPPER
MIDDLE
LOWER
GRIPER BAY
OKSE BAY
HECLA BAY
BIRD FIORD
WEATHERALL
BLUE FIORD
EIDS
DISAPPOINTMENT BAY
STUART BAY
BATHURST ISLAND
KITSON R.
SNOWBLIND BAY
PEEL SOUND
SILURIAN
IMINA / CAPE RAWSON
IBBETT BAY
CAPE PHILLIPS
READ BAY
ALLEN BAY
ORDOVICIAN
IRENE BAY
THUMB MOUNTAIN
BAY FIORD
HAZEN
ELEANOR RIVER
BAUMANN FIORD
CANROBERT
COPES BAY
CAMBRIAN
GRANT LAND
PARRISH GLACIER
SCORESBY BAY
KANE BASIN
RAWLINGS BAY (S.L.)
ELLA BAY
KENNEDY CHANNEL
PROTEROZOIC
P€ crystalline rocks

FIGURE 4-17: Stratigraphic column Franklin Bas (from Stuart Smith and Wennekers, 1977)

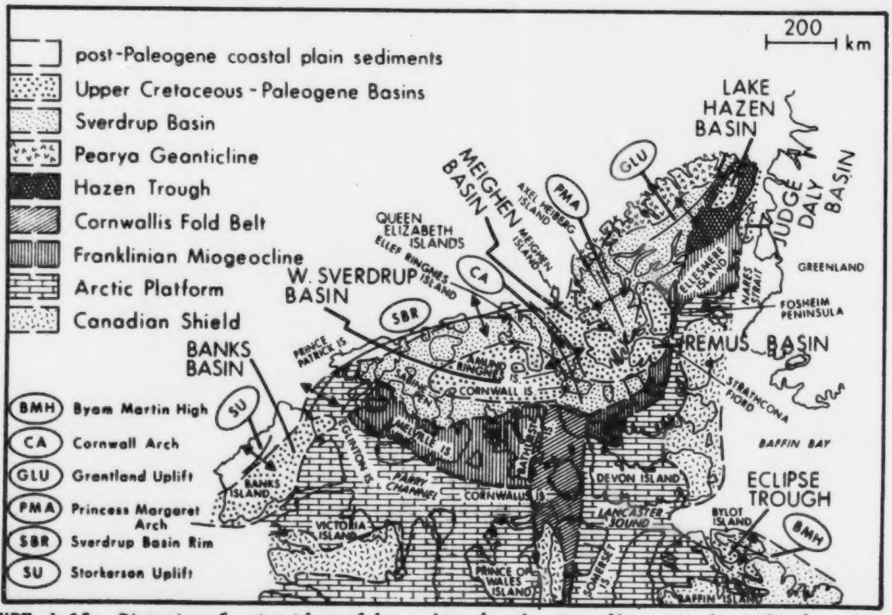
post-Paleogene coastal plain sediments
Upper Cretaceous - Paleogene Basins
Sverdrup Basin
Pearya Geanticline
Hazen Trough
Cornwallis Fold Belt
Franklinian Miogeocline
Arctic Platform
Canadian Shield
200 km
BMH Byam Martin High
CA Cornwall Arch
GLU Grantland Uplift
PMA Princess Margaret Arch
SBR Sverdrup Basin Rim
SU Storkerson Uplift
LAKE HAZEN BASIN
MEIGHEN BASIN
JUDGE DALY BASIN
QUEEN ELIZABETH ISLANDS
W. SVERDRUP BASIN
REMUS BASIN
BANKS BASIN
ECLIPSE TROUGH
AXEL HEIBERG ISLAND
MEIGHEN ISLAND
ELLEF RINGNES ISLAND
ELLESMERE ISLAND
GREENLAND
NARES STRAIT
FOSHEIM PENINSULA
PRINCE PATRICK IS
CORNWALL IS
STRATHCONA FIORD
BAFFIN BAY
BANKS ISLAND
EGLINTON IS
MELVILLE IS
PARRY CHANNEL
BATHURST IS
CORNWALLIS IS
DEVON ISLAND
LANCASTER SOUND
BYLOT ISLAND
VICTORIA ISLAND
PRINCE OF WALES ISLAND
SOMERSET IS
BAFFIN ISLAND

FIGURE 4-18: Structural stratigraphic units in the Canadian Arctic Islands, showing location of Upper Cretaceous-Paleogene basins (from Miall, 1981)

uplifts and downwarps. A series of smaller basins were formed and these were filled by debris shed from adjacent intrabasin upwarps and fold belts. These basins include the Banks, West Sverdrup, Meighen, Eclipse, Lake Hazen and Judge Daly Basins (Miall, 1981 and Fig. 4-18). The Eureka Sound Formation, which fills them, was formed during the early stages of the Eurekan Orogeny and can be correlated in part with seafloor spreading events.

The Remus Basin, centered on Fosheim Peninsula and easternmost Axel Heiberg Island, has attracted most of the interest of coal exploration groups, but the Banks, Lake Hazen and Judge Daly Basins (Fig. 4-18) also contain coal and have been looked at as well. The Remus and Banks Basins contain mainly deltaic-marine fill, while the Lake Hazen and Judge Daly Basins are mainly fluvial lacustrine (Miall, 1981).

Initial deposition of the Eureka Sound Formation marked the end of uniform subsidence of the Sverdrup Basin and the beginning of the Eurekan Orogeny. Late Cretaceous uplift resulted in the formation of broad, partly fault-controlled arches and fold belts of considerable topographic relief, resulting in synorogenic and possibly post-orogenic deposition of the Eureka Sound Formation. In the Remus Basin, deposition took place in alluvial plain, delta transition and marine environments or facies, as indicated by position in the stratal succession, gross lithology, sedimentary and biogenic structures, mineralogy and fossils (Bustin, 1977).

Deformation in the Remus Basin reached a peak with mid-Cenozoic folding and faulting. Eurekan structures were superimposed with concordant trends on older Ellesmerian structures but were not confined to areas deformed during Paleozoic times. South of Bay Fiord many thrust faults cut strata ranging in age from late Paleozoic to Cenozoic, and commonly the fault planes follow Carboniferous evaporites. The thrust faults are usually low angle and generally have their hanging walls displaced towards the east. Normal faults are common in areas affected by the Eurekan Orogeny. Some normal faults are at least Eocene in age and probably younger as they are observed cutting the youngest Eureka Sound Formation sediments in the area. The normal faults are usually very steep and their displacements appear mainly to be small.

"Major coal resources occur within the late Cretaceous and Tertiary Eureka Sound Formation. The formation, which ranges in thickness from thin erosional outliers on central Axel Heiberg Island to a maximum thickness of 3,300 m on Fosheim Peninsula, Ellesmere Island, contains numerous thick seams of coal. The coal is highly variable in quality, but seams of clean, vitrain-rich coal several metres thick are present. The rank of the coal ranges from lignite through sub-bituminous to high-volatile bituminous as measured by vitrinite reflectance. Inferred resources within the area of study are calculated as 30,000 million tonnes of which 15,000 million tonnes are lignite, 11,000 million tonnes are sub-bituminous and 4,000 million tonnes are high-volatile bituminous." (Bustin, 1980, p. 38). Axel Heiberg and Ellesmere Islands encompass only a small portion of the outcrop of Eureka Sound Formation and of the other coal measures of the Arctic Archipelago, and considerable additional coal resources will undoubtedly be found (Fig. 4-14 and Miall, 1981).

Good quality 1:250,000 scale geological maps have been published for most of Axel Heiberg and Central Ellesmere Island by the Geological Survey of Canada (Thorsteinsson,1971 a-c, 1972 a-d).

FOSHEIM PENINSULA WEST COAL LICENCES

Petro-Canada	Coal
Coal Division	49 G,H;340 B
P.O. Box 2844	
Calgary, Alta., T2P 3E3	

REFERENCES

Bustin (1977, 1980); Miall (1981); Thorsteinsson (1971b, 1972b, 1972d, 1972e).

DIAND assessment report 062157.

PROPERTY

Fosheim Peninsula coal licences are those numbered 266 to 268, 273 to 278 and 287 to 300. The 23 licence areas are shown on Fig. 4-15.

LOCATION

The 23 coal licences are on Fosheim Peninsula, west-central Ellesmere Island. Eureka, on the north shore of Slidre Fiord, is on the west side of the peninsula, but the Eureka Sound Formation is present mainly in the central and eastern area (Figs. 4-14 and 4-19).

HISTORY

Bustin (1980) estimated the coal resources of the Fosheim Peninsula area to be in the order of 21,000

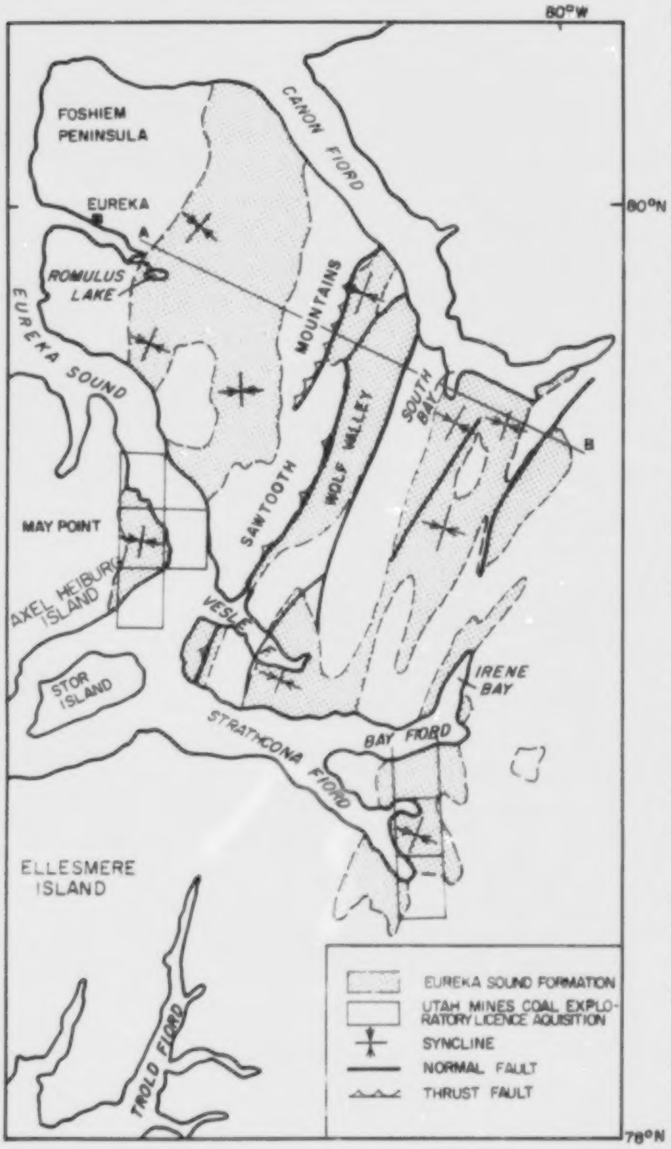
80°W
FOSHIEM PENINSULA
CANON FIORD
EUREKA
A
80°N
ROMULUS LAKE
EUREKA SOUND
MOUNTAINS
SAWTOOTH
WOLF VALLEY
SOUTH BAY
B
MAY POINT
AXEL HEIBURG ISLAND
STOR ISLAND
VESLE
IRENE BAY
STRATHCONA FIORD
BAY FIORD
ELLESMERE ISLAND
TROLD FIORD
EUREKA SOUND FORMATION
UTAH MINES COAL EXPLORATORY LICENCE AQUISITION
SYNCLINE
NORMAL FAULT
THRUST FAULT
78°N

FIGURE 4-19: Distribution of Eureka Sound Formation in the Fosheim Peninsula, cross-section A-B is given in Figure 4-21

million tonnes. In 1981, measurement and analysis of several additional coal-bearing sections confirmed Bustin's estimate.

The coal licences were granted by DIAND July 16, 1981.

DESCRIPTION

The regional structure comprises a broad northerly trending synclinorium (Thorsteinsson, 1972e), or the Remus Basin (Miall, 1981), with broad gently northerly plunging anticlines and synclines and northerly trending normal faults (Figs. 4-20 & 4-21). It has been referred to informally as the Fosheim Synclinorium. The Eureka Sound Formation (Te) conformably overlies Upper Cretaceous shales of the Kanguk Formation (Kk) along the east and west limbs of the synclinorium. Over 3,300 m of coal-bearing Eureka Sound Formation is exposed in a section along Remus Creek on the west flank of the synclinorium. Bustin (1980) measured 28 seams greater than 1 metre and up to 10 m thick in this section. He also pointed out that, "In general the thickness and quality of the coal seam deteriorated from the base to the top of the section. Coal seams at the base of the coal measures are clean, massive with little finely divided argillaceous material and few discrete rock bands. Towards the top of the coal measures, particularly in the upper 1,000 m, the coal is commonly argillaceous and granular, and in some areas gradational to carbonaceous mudstones and shales." Bustin (1980, p. 44).

At one locality a thick (5 m) seam of anthracite is exposed in a cliff near a small creek. Leaf imprints, branches, and in-situ roots of Metasequoia are fairly common, as are 'clinkers' of oxidized or 'burnt' coal. The latter are easily identified by their distinctive red colour in contrast with the normal buff colour of the countryside.

The Eureka Sound Formation consists of roughly 3,300 meters of clastic and minor marine sediments in the region of Fosheim Peninsula. This thins southward to approximately 2,500 meters in the vicinity of Strathcona Fiord. The lithologies consist of fine to coarse-grained sandstones, siltstones, carbonaceous and micaceous claystones, shales, coals and limestones.

West of the Sawtooth Mountains the property is characterized by gently undulating plains ranging in elevation from sea level to a maximum of 300 meters. The area is bisected by the Slidre River flowing from east to west, which is fed by meltwaters from the snowfields of the Sawtooth Mountains. The Slidre River has a broad meandering valley and its northwest and southeast trends are probably bedrock controlled. Tributaries of the Slidre River flow mainly in a north-south pattern and are typically steep walled and narrow. The area between the streams is gently rolling tundra covered with soil polygons commonly up to 50 meters in diameter.

CURRENT WORK AND RESULTS

The Eureka Sound Formation on Fosheim Peninsula-West was shown to be 3,200 meters thick and coal-bearing throughout. Multiple seams up to fifteen meters in thickness exist in the area. The rank of the seams range from high volatile 'C' bituminous at the base of the section to lignite at the top. The coal seams are laterally persistent and can be traced up to fifteen kilometers along strike. The quality of a fifteen-meter seam near the top of the formation yielded 17,267 KJ/kg, 0.34% sulphur with 7.0% ash on an as-received basis. Inferred coal resources within 200 meters of surface were estimated to be in the order of 21,000 million tonnes. Petro-Canada's 1982 efforts have resulted in a slightly revised figure of 21,900 million tonnes in the inferred category.

The composition of the coal suggests that peat was deposited in a forest moor environment (Bustin, 1977). Judging by the lateral continuity, thickness and absence of partings in most of the observed seams, it is apparent that coal-forming swamp conditions prevailed over large areas of the flood plain. Laterally persistent ironstones overlay many of the seams suggesting that swamp conditions at these localities were terminated by submergence as lakes formed.

The distribution of the coal seams within the Eureka Sound Formation is variable from area to area due to the different facies at each locality. The alluvial plain facies, which is the main coal-bearing facies, also changes character thereby affecting the percentage of coal in the section.

Six marginal coal licences were relinquished in 1983, leaving 17 in good standing.

FOSHEIM PENINSULA-EAST COAL LICENCES

Petro-Canada Coal
Coal Division 49 E, H
P.O. Box 2844 76°52'-80°N
Calgary, Alta., T2P 3E3 80°-84°W

REFERENCES

Gibbins (1984); Thorsteinsson (1972c, 1972d).
DIAND assessment report 062157.

PROPERTY

Petro-Canada Exploration Ltd.'s Fosheim Peninsula-East area includes 34 coal licences as shown in Fig. 4-15. These are numbered 228-233, 240-247, 251-265, 269-272 and 279.

LOCATION

The Fosheim Peninsula-East area lies southeast of the Sawtooth Range, between Bay Fiord to the south and Canon Fiord to the northeast (Fig. 4-22). Eureka is 75 to 150 km to the northwest.

HISTORY

The 34 coal licences were granted in July,1981. In 1981 a number of sections of Eureka Sound Formation were measured and coal seams were sampled. The quality of the coal is highly variable, from lignite to high-volatile bituminous C with 10 to 23% ash. Significant coal does not occur in the basal part of the Eureka Sound Formation. A few thick seams occur locally in the upper part, but large coal reserves are not likely to exist east of the Sawtooth Range (Gibbins, 1984).

DESCRIPTION

East of the Sawtooth Mountains the Eureka Sound Formation is distinct lithologically and sedimentologically from Tertiary strata deposited west of the mountains. The formation is composed of non-marine clastics as well as shallow marine sediments and includes at least one major transgressive interval. Tertiary strata gradually overstep progressively older formations towards the east margin of the Sverdrup Basin (Fig. 4-20).

Generally speaking the area is characterized by several large overthrusts which place strata as old as Ordovician on Tertiary Eureka Sound Formation. The overthrusts are generally low angle and have hanging walls displaced towards the east. The faults strike northeast and are thought to be rooted in Carboniferous evaporites (Thorsteinsson, 1972c, d). They are related to the Eurekan Orogeny and are most likely late Eocene to Miocene in age.

The trend of the normal faults are roughly parallel to the compressional faulting. Most of the normal faults are steep and have hanging walls down dropped towards the centre of the Sverdrup Basin. The normal faults are thought to have been formed during the Ellesmerian Orogeny and have been reactivated during the Eurekan Orogeny.

The folding confined to the Eureka Sound Formation is generally broad and open with rounded hinges. Dips rarely exceed 40° and are usually in the 10° to 30° range. Most of the larger folds plunge towards the north at shallow angles. Structurally this area is the most complex of all the areas in Petro-Canada's coal licences.

In contrast to the area west of the Sawtooth Mountains, the topography east of the mountains is completely rugged. This area is typically mountainous

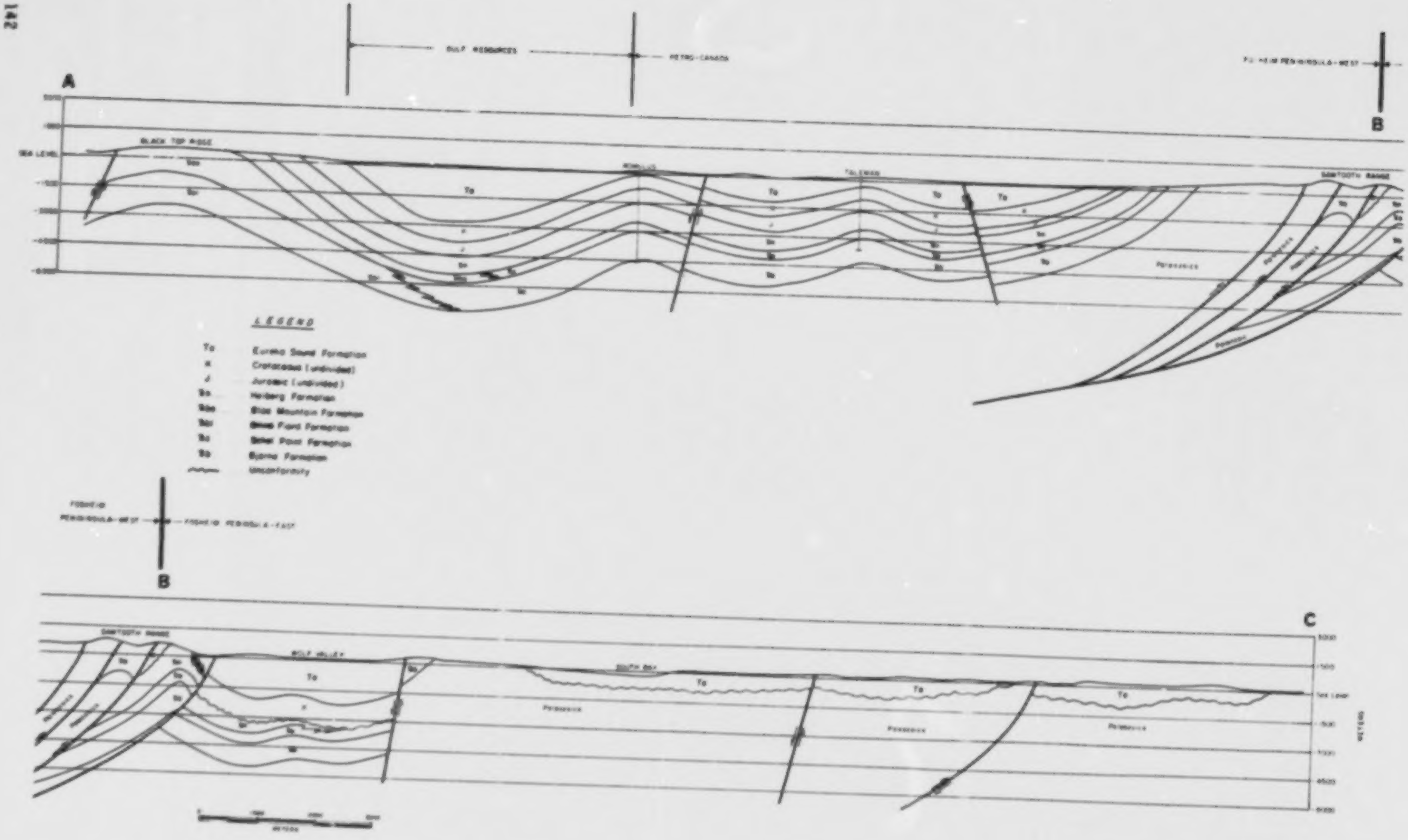
GULF RESOURCES
PETRO-CANADA
A
B
BLACK TOP RIDGE
SEA LEVEL
SAWTOOTH RANGE
To
K
J
Paleozoic
LEGEND
To Eureka Sound Formation
K Cretaceous (undivided)
J Jurassic (undivided)
Heiberg Formation
Blaa Mountain Formation
Blind Fiord Formation
Bjorne Formation
Unconformity
FOSHEIM PENINSULA-WEST
FOSHEIM PENINSULA-EAST
B
C
GULF VALLEY
SOUTH BAY
metres

FIGURE 4-30: Cross-section Fosheim Peninsula west and east (from DIAND assessment report 082157)

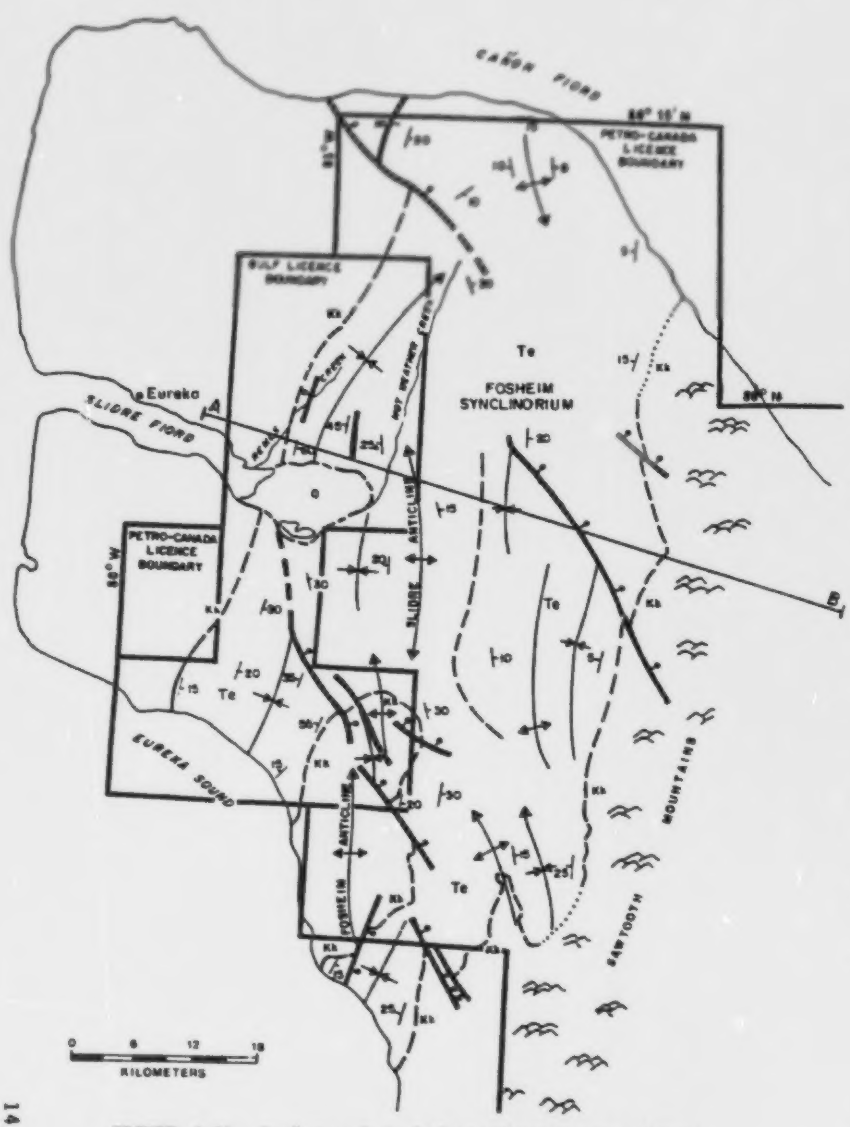
CAÑON FIORD
PETRO-CANADA LICENCE BOUNDARY
80° 15' W
81° W
80° W
GULF LICENCE BOUNDARY
HOT WEATHER CREEK
SLIDRE ANTICLINE
FOSHEIM ANTICLINE
FOSHEIM SYNCLINORIUM
Te
Kh
Q
Eureka
SLIDRE FIORD
A
B
PETRO-CANADA LICENCE BOUNDARY
EUREKA SOUND
SAWTOOTH MOUNTAINS
0 6 12 18
KILOMETERS

FIGURE 4-21: Geology of Fosheim Peninsula West (from DIAND assessment report 062157)

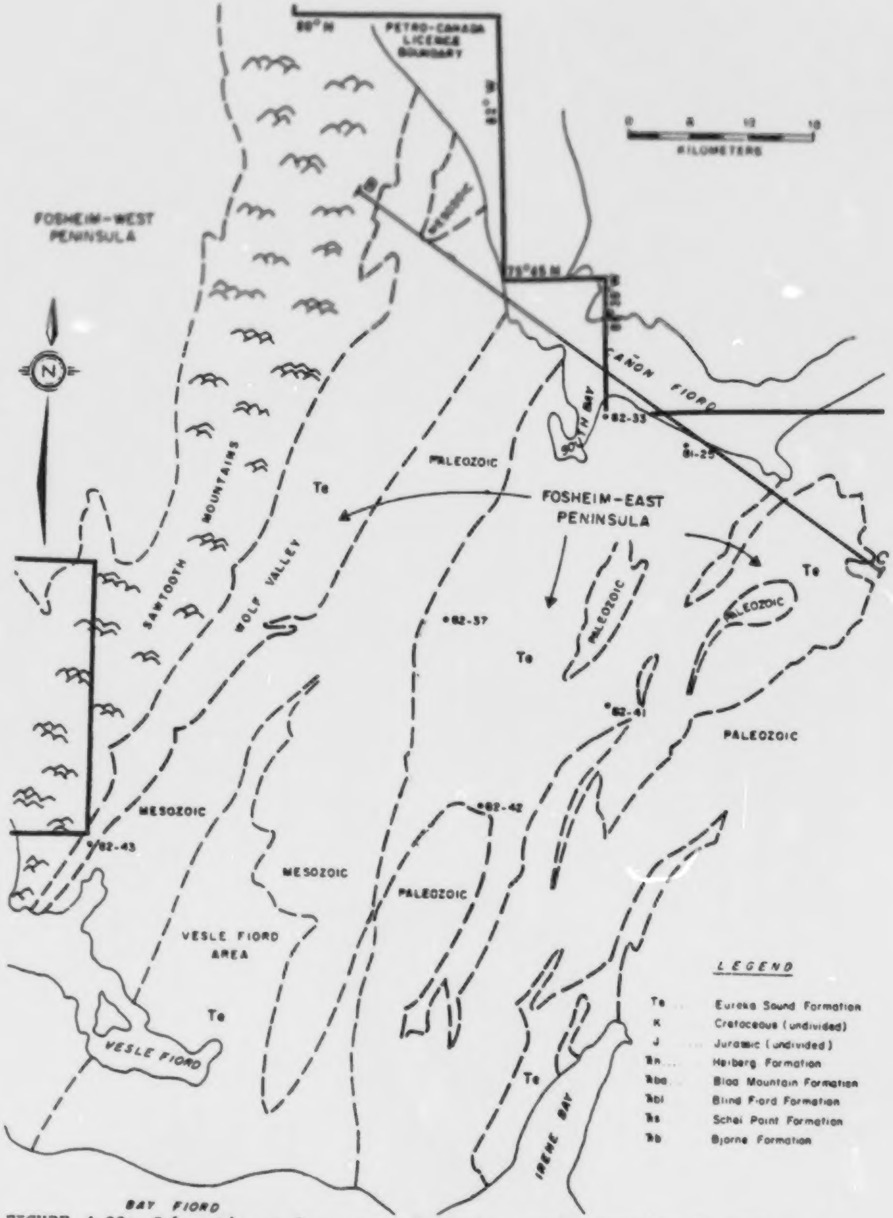
80° W
PETRO-CANADA LICENCE BOUNDARY
79°45' W
0 5 10 15
KILOMETERS
FOSHEIM-WEST PENINSULA
SAWTOOTH MOUNTAINS
WOLF VALLEY
CAÑON FIORD
SOUTH BAY
82-33
81-25
C
PALEOZOIC
FOSHEIM-EAST PENINSULA
Te
82-37
82-41
82-42
82-43
MESOZOIC
VESLE FIORD AREA
VESLE FIORD
IRENE BAY
BAY FIORD
LEGEND
Te Eureka Sound Formation
K Cretaceous (undivided)
J Jurassic (undivided)
TRh Heiberg Formation
TRba Blaa Mountain Formation
TRbl Blind Fiord Formation
TRs Schei Point Formation
TRb Bjorne Formation

FIGURE 4-22: Schematic geology map of Eureka Sound Formation on east Fosheim Peninsula (from DIAND assessment report 062157)

and has numerous broad plateaus incised by streams. Valleys between the mountains and plateaus are commonly glaciated. The mountains reach a maximum elevation of 1,400 meters with many capped by permanent icefields.

CURRENT WORK AND RESULTS

The Eureka Sound Formation was examined at approximately 30 localities east of the Sawtooth Mountains. At each locale the formation was measured and samples of coal seams were taken. Generally there was a greater proportion of medium to coarse-grained sandstone east of the mountains and all the lithologies are better indurated than to the west. There is also a relatively greater percentage of higher flow regime sedimentary structures.

Reconnaissance exploration in the past had indicated that the Eureka Sound Formation in this area was entirely of terrestrial origin. However, the 1982 program came across a 200-300 m thick claystone unit of marine origin not previously reported. The high percentage of coarse clastics associated with the predominance of anastomosing and meandering stream deposits, a marine unit and the virtual absence of thick coal seams indicates the depositional environments were not conducive to stable coal-forming swamps in this area.

Most of the coal seams appeared to have high ash content and were less than one meter in thickness. Due to the paucity of one meter plus coal seams east of the Sawtooth Mountains sampling was limited to only four seams. Their average rank is approximately sub-bituminous "B".

East of the Sawtooth Mountains significant coal resources do not occur in the Eureka Sound Formation. The paucity of seams over one meter in thickness has precluded any resource calculations in this area. All 34 coal licences were relinquished in 1983.

COAL LICENCE #286 - MAY POINT

Petro-Canada	Coal
Coal Division	49 G/7
P.O. Box 2844	79°37'N,85°45'W
Calgary, Alta., T2P 3E3	

REFERENCES

Bustin (1980); Gibbins (1984); Thorsteinsson (1972b).

DIAND assessment report 062157.

PROPERTY

Coal Licence 286 49 G/7 SW

LOCATION

Axel Heiberg Island is in the north-central Arctic Archipelago. Petro-Canada Ltd.'s single coal licence on Axel Heiberg Island is several km west of May Point and is bordered by Utah Mines Ltd.'s Coal Licence 164 on its eastern side and Gulf Canada Resources Ltd.'s Coal Licence 168 to the south (Fig. 4-15).

HISTORY

Petro-Canada Ltd.'s Coal Division became interested in the coal potential of Axel Heiberg Island after Bustin (1980, p. 48) published a report that estimated the coal resources of Eastern Axel Heiberg Island to be in the order of 9,000 million tonnes of lignite, sub-bituminous and high volatile bituminous. In 1981 Petro-Canada Ltd. did reconnaissance exploration of coal beds in the western and eastern parts of Ellesmere Island.

Petro-Canada Ltd., Utah Mines Ltd., and Gulf Canada Resources Ltd. all explored coal licences near May Point, eastern Ellesmere Island in 1981 (Gibbins, 1984).

DESCRIPTION

Axel Heiberg Island is divided into two structural domains by the southeasterly plunging Princess Margaret Arch - a major structural and topographic high that extends the full length of the island (Fig. 4-18). West of the Princess Margaret Arch folding is characteristically tight, whereas east of the arch folding is more open.

On eastern Axel Heiberg Island, the Eureka Sound Formation paraconformably overlies strata ranging in age from late Cretaceous through Triassic and is overlain with angular unconformity by Miocene conglomerates and sandstones of the Beaufort Formation. The Eureka Sound Formation, which ranges in thickness from thin erosional outliers to a maximum of 1,500 m, comprises carbonaceous shales, siltstones, sandstones and thin coals. On easternmost Axel Heiberg Island, at May Point, the Eureka Sound Formation locally conformably overlies the Kanguk Formation (Thorsteinsson, 1972b).

In the May Point area, one coal seam seven meters thick sporadically outcrops along a strike length of 15 kilometers. The rank of this seam is sub-bituminous "B". A 1981 analysis indicated 14%

moisture, 36% volatile matter, 5% ash, 46% fixed carbon, 0.2% sulfur and a calorific value of 23,814 KJ/kg (10,242 BTU) on a moist, mineral matter-free basis.

CURRENT WORK AND RESULTS

The 1982 exploration showed the May Point area to be covered by a relatively thin veneer of Eureka Sound Formation. The lack of outcrop, mainly due to flat, gentle topography and shallowly dipping strata, precluded a detailed geological investigation and attempts to make resource calculations.

However, only the basal part of the formation is preserved along the eastern boundary and most of Petro-Canada Ltd.'s licence was found to lie stratigraphically below the Eureka Sound Formation and has been relinquished. Gulf Canada Resources Ltd. also released their coal licence at May Point.

VESLE FIORD COAL LICENCES

Petro-Canada
Coal Division
P.O. Box 2844
Calgary, Alta., T2P 3E3

Coal
49 E-H
78°53'-79°23'N,
82°30'-85°W

REFERENCES

Thorsteinsson (1972 a-d).
DIAND assessment report 062157.

PROPERTY

Sixteen coal licences : 225-227, 234-239, 248-250 and 282-285.

LOCATION

The coal licences are centered on the northeastern shore of Vesle Fiord, southwestern Ellesmere Island (Fig. 4-15). This area is about 550 km north-northeast of Resolute Bay.

HISTORY

The coal licences were granted by DIAND in July, 1981.

DESCRIPTION

The Eureka Sound Formation is in the order of 2,700 meters thick in the Vesle Fiord area, where four distinct members have been recognized. The basal member consists of 150 m of sandstones of deltaic origin and is gradational with marine shales of the underlying Kanguk Formation. The overlying lower member consists of rhythmically bedded sandstones, siltstones, claystones and coals arranged in fining-upward sequences. This member is between 400 and 600 meters thick and is interpreted as an alluvial plain deposit.

The middle member is lithologically distinct from an underlying dark grey claystone member. This member is characterized by pale yellow, calcareous sandstones, siltstones and limestones. These lithologies collectively comprise 400 to 700 meters of strata north of Vesle Fiord in a prominent syncline (Fig. 4-23). This sequence is partly marine.

The upper member is found south of Vesle Fiord. It is composed of approximately 500 meters of interbedded sandstones, siltstones and lignite. The sandstones range from very fine to medium grained, calcareous to carbonaceous, rippled, cross-bedded and often rooted. Many of the sandstones display characteristics common to fluvial deposition. It contains lignitic coal seams 1 to 4 m thick and has been interpreted as an alluvial plain deposit.

The structures confined to the Eureka Sound Formation in the Vesle Fiord area are composed of several broad synclines north and east of the fiord. South of Vesle Fiord, the Eureka Sound Formation is deformed into a series of parallel folds. The western flank of the area is bounded by a series of extension faults while the eastern boundary is marked, for the most part, by a conformable contact with the Kanguk Formation (Fig. 4-23).

CURRENT WORK AND RESULTS

Reconnaissance of the Vesle Fiord area indicated the presence of several seams exceeding four meters in thickness. Three seams were sampled and proximate analyses were undertaken. The rank of the coal in this area ranges from sub-bituminous "A" (calorific value) near the base of the section to lignite near the top.

The basal and middle members of the Eureka Sound Formation are not coal bearing and the upper member, which contains approximately one-half of the resources, occurs in an area which is structurally deformed. The formation is tightly folded and it appears most of the resources in the upper member are below 200 meters of the surface.

The 4 coal licences, that were retained at the end of 1983, have an inferred resource potential of 4,000 million tonnes.

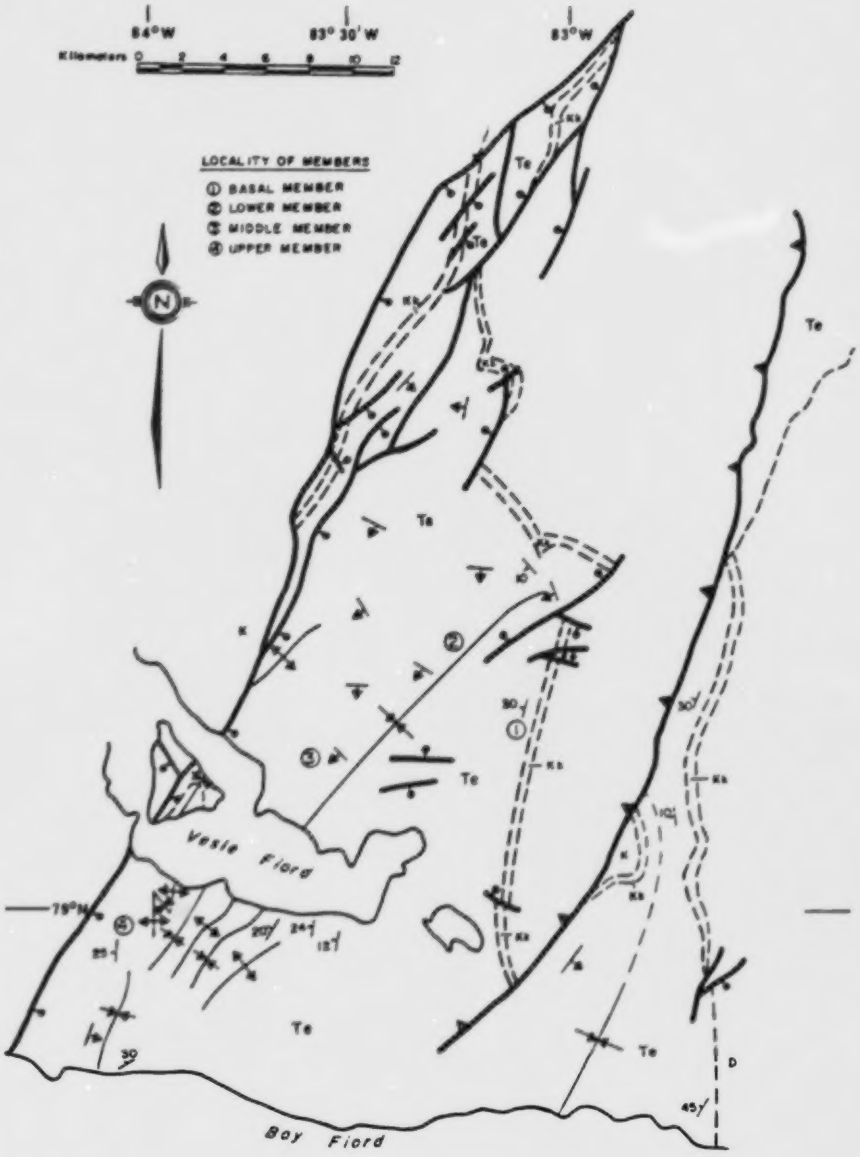
84°W
83° 30'W
83°W
Kilometers 0 2 4 6 8 10 12
LOCALITY OF MEMBERS
① BASAL MEMBER
② LOWER MEMBER
③ MIDDLE MEMBER
④ UPPER MEMBER
N
Te
Ks
K
D
79°N
Vesle Fiord
Bay Fiord

FIGURE 4-23: Schematic geology map of Vesle Fiord area (from DIAND assessment report 062157)

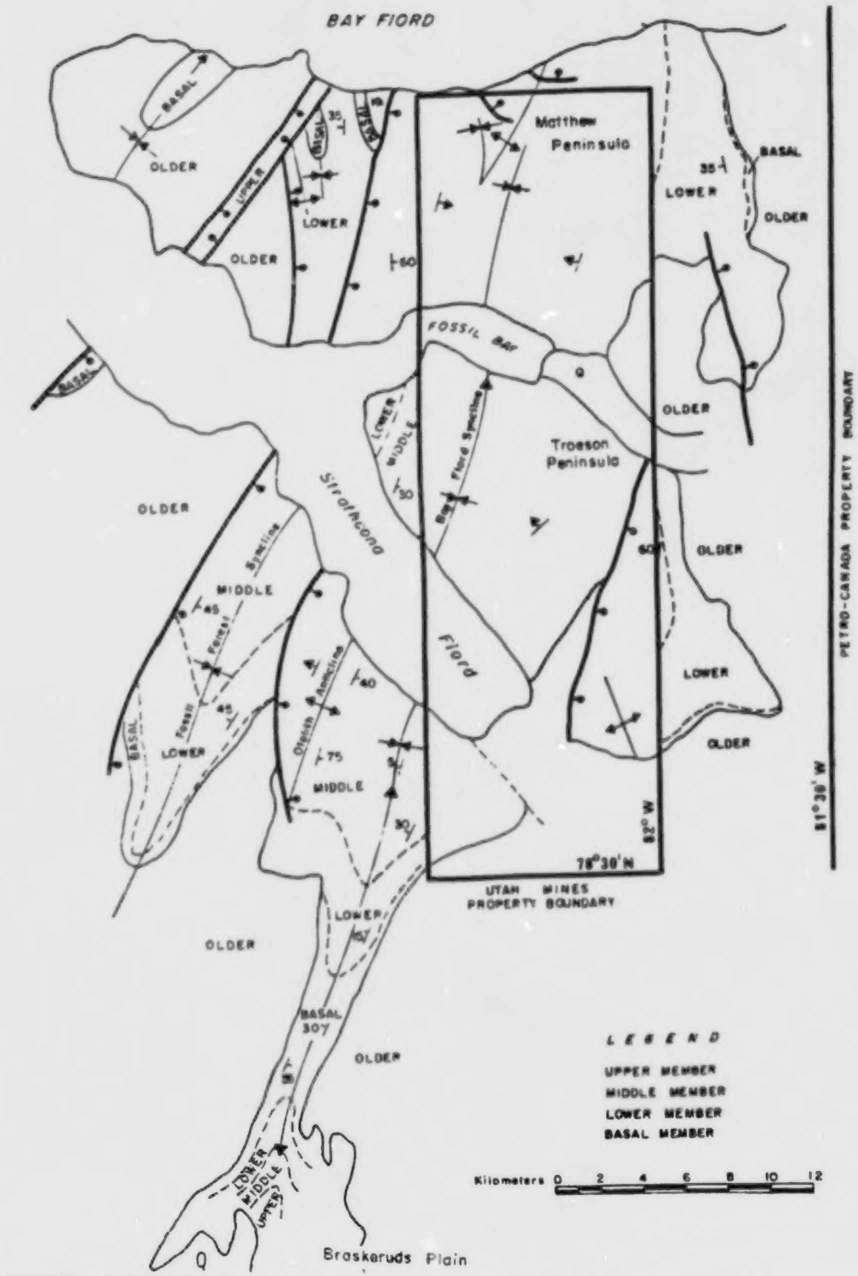
BAY FIORD
Matthew Peninsula
Troeson Peninsula
FOSSIL BAY
Strathcona Fiord
Bay Fiord Syncline
Fossil Forest Syncline
Otopia Anticline
BASAL
LOWER
MIDDLE
UPPER
OLDER
Q
82°W
78°30'N
81°30'W
UTAH MINES PROPERTY BOUNDARY
PETRO-CANADA PROPERTY BOUNDARY
Braskeruds Plain
LEGEND
UPPER MEMBER
MIDDLE MEMBER
LOWER MEMBER
BASAL MEMBER
Kilometers 0 2 4 6 8 10 12

FIGURE 4-24: Schematic geology of the Eureka Sound Formation in Strathcona Fiord area (from DIAND assessment report 062157)

COAL RESOURCE TOTAL - VESLE FIORD AREA

Minimum Seam Thickness	Composite Coal Thickness	Inferred Megatonnes
1 meter	5 meters (lower mbr.)	2,340
1 meter	10 meters (upper mbr.)	1,794

STRATHCONA FIORD COAL LICENCES

Petro-Canada	Coal
Coal Division	49 E/5-7,10-15,F/16
P.O. Box 2844	78°15'-78°52'N,
Calgary, Alta., T2P 3E3	81°-85°W

REFERENCES

Gibbins (1984); Thorsteinsson (1972c).
DIAND assessment report 062157.

PROPERTY

Twenty-one coal licences: 209-224, 280-281 and 234-237.

LOCATION

The coal licences lie north and south of Strathcona Fiord. The area is bound by Bay Fiord on the north and Braskeruds Plain to the south (Fig. 4-15 and 4-24). The Vesle Fiord and Fosheim Peninsula-East coal licences are immediately north of the Strathcona Fiord licences.

HISTORY

In May,1981, Utah Mines Ltd. obtained seven coal licences in the Strathcona Sound area to protect a large canoe-shaped syncline of coal-rich Eureka Sound Formation (Gibbins, 1984, pp. 117-118). In July,1981, Petro-Canada obtained 110 coal licences in the region including several that completely surround the Utah Mines Ltd. area. Utah Mines Ltd. subsequently relinquished 4 of their coal licences and Petro-Canada applied for and received coal licences 334-337 in May,1982. Considerable coal resources are believed to exist on the three remaining Utah Mines Ltd. coal licences.

Results of Utah Mines Ltd. and Petro-Canada 1981 field work are summarized in Gibbins(1984, p. 117-118 and 122).

DESCRIPTION

Up to 2,500 meters of the Eureka Sound Formation is preserved in a broad syncline that extends from Bay Fiord across Strathcona Fiord to Braskeruds Plain (Fig. 4-24). Here it can be divided into four distinct members: basal, lower, middle and upper, similar to those identifiable in the Vesle Fiord area to the northwest, where only the lower and upper members are coal bearing.

The Strathcona Fiord area comprises a series of parallel folds and faults. The major folds and faults all strike approximately north-northeast. The structures affecting the Eureka Sound Formation are thought to be superimposed on the older Paleozoic structures with concordant strike. The three main folds in the area have locally been referred to as the Bay Fiord Syncline, Otoloth Anticline and Fossil Forest Syncline (Fig. 4-24). The Bay Fiord Syncline, which is the prominent fold in the area, extends south from Bay Fiord to Braskeruds Plain where the fold disappears under a cover of Quaternary deposits. The syncline is a broad, open, cylindrical fold with a wave length of approximately 8 km. The fold is assymetrical with the east limb inclined up to 40° and the west limb up to 75°.

CURRENT WORK AND RESULTS

Samples of seams up to three meters thick were collected from the lower part, while seams up to 24 meters thick were sampled in the upper part of the Eureka Sound Formation.

Bed moisture of coal seams, which ranged from 16 to 28 percent, appeared to be more representative of sub-bituminous coals than lignite. Ash values varied widely, from 5 to 45 percent, and similar to Vesle Fiord the mineral matter appeared to be disseminated rather than in discrete bands. Sulphur content was low - not exceeding 0.75 percent in any of the seams. The volatile content appeared consistent with low rank coals when converted to a dry ash-free basis. The calorific value of the sub-bituminous coals averaged approximately 21,750 KJ/kg on a moist, mineral-matter-free basis while the calorific value of the lignites near the top of the formation averaged 17,500 KJ/kg on a moist mineral-matter-free basis.

Of the fourteen coal seams sampled, all were plotted using bed moisture versus specific volatile index. Of all the samples taken, only two appeared oxidized. The rank, as determined by calorific value, places almost all the samples in the sub-bituminous "C" category.

Selected samples were sent to Cascade Coal Petrography for a complete maceral analysis and reflectance determination. The reflectances recorded from the vitrinite indicated slightly higher ranks to several of the samples. This is probably due to partial oxidation of the vitrinite giving a slightly attenuated reading. The ranks indicated by the reflectance method ranged from sub-bituminous "A" to lignite. All but two of the nine samples displayed extremely high percentages of mineral matter, but the high percentage of mineral matter indicated from the petrographics was not reflected in the proximate analysis. In fact the petrographic ash was about twice as high as the ash from the proximate analysis. This might be explained in two ways: some of the macerals were misidentified as ash or a large percentage of the mineral matter volatized upon proximate ashing leaving only the inert residue.

Examination of the macerals under ultraviolet light showed some liptinitic material combined with mineral matter that was not visible under normal light. This might explain the seemingly high mineral matter count. However, if the mineral matter count stayed substantially high, it probably indicates part of the mineral matter (calcite) is volatized upon combustion. This could be determined by an analysis of the volatile matter.

Geologic Resources

The Eureka Sound Formation has been divided locally into four informal members in the Strathcona Fiord area. Only the lower and upper members contain continuous seams thicker than one meter. Due to erosion, the upper member, which contains the thickest coal seams, is only preserved on a few of Petro-Canada's licences. The lower member, however, underlies most of Petro-Canada's licences in the area but seams are rarely thicker than a couple of meters. Utah Mines Ltd.'s licences cover most outcrops of the upper member, and the seams on their property have not been included in Petro-Canada Ltd.'s resource calculations in the area.

Several assumptions have been made in order to complete the resource calculations for this area.

RESOURCE TOTAL - STRATHCONA FIORD AREA

Minimum Seam Thickness	Composite Coal Thickness	Inferred Megatonnes
1.0 meter	11 (lower mbr.)	6,013
2.5 meters	6 (lower mbr.)	3,280
1.0 meter	40 (upper mbr.)	840

Petro-Canada has relinquished all of its coal licences in the Strathcona Fiord area.

VENDOM FIORD COAL LICENCES	Coal
Petro-Canada	49 D/13-15,E/2-4
Coal Division	$77^{0}45$-$78^{0}15$'N,
P.O. Box 2844	$81^{0}30$'-84^{0}W
Calgary, Alta., T2P 3E3	

REFERENCES

Okulitch (1982); Thorsteinsson (1972c).

DIAND assessment report 062157.

PROPERTY

Eighteen coal licences:191-208.

LOCATION

The coal licence area is centered about the northern end of Vendom Fiord (Fig. 4-15). The area is about 250 km south of Eureka and 500 km northeast of Resolute Bay.

HISTORY

These coal licences were granted to Petro-Canada by DIAND in July 1981.

DESCRIPTION

South of the Strathcona Fiord area, along Vendom Fiord, several thrust-fault-bounded exposures of Eureka Sound strata are present. Eurekan overthrusting has emplaced Paleozoic strata on top of Late Cretaceous to Eocene clastics of the Eureka Sound Formation. Okulitch (1982) estimated crustal shortening ranges from 25% to 50% in the region. The compressive stress of the Eurekan Orogeny appears to have been directed from the west with the possibility of the thrusting being rooted in the evaporitic horizons of the Ordovician Baumann Fiord Formation, which displays considerable disharmony.

The northern part of the area has been mapped at 1:250,000 scale by Thorsteinsson (1972c).

CURRENT WORK AND RESULTS

Reconnaissance exploration in the 1982 field season showed that the Vendom Fiord area has low economic potential for coal and all the Vendom Fiord coal licences were relinquished in 1983.

STENKUL FIORD COAL LICENCES	Coal
Petro-Canada	49 C/8,D/5,6
Coal Division	$77^{0}15$'-$77^{0}30$'N,
P.O. Box 2844	$82^{0}30$'-85'W
Calgary, Alta., T2P 3E3	

REFERENCES

Fortier and others (1963); Riediger (1985).

DIAND assessment reports 062187, 062157.

PROPERTY

Ten coal licences: 338 to 347.

LOCATION

The coal licences are centered on Stenkul Fiord of southern Ellesmere Island (Fig. 4-15). The area is 400 km northeast of Resolute Bay and 100 km north of Grise Fiord.

HISTORY

Petro-Canada was granted 10 coal licences in the Stenkul Fiord area in August, 1982.

DESCRIPTION

The Eureka Sound Formation is preserved in several graben structures in the Stenkul Fiord area (Fig. 4-25). The formation is at least 165 m thick and overlies the Devonian Okse Bay Formation. This contact is marked by a minor angular unconformity. Multiple, thick coal seams exceeding fifteen meters in thickness are exposed. The seams are flat lying, near surface and range from sub-bituminous "C" to lignite in rank. This area also contains some of the thickest coals in the Arctic and may be the same age (Eocene) as the thick Strathcona Fiord seams.

The Tertiary strata consist of an uncompacted sequence of claystones, sandstones and thick lignite seams ranging from a few centimeters to over fifteen meters in thickness. The sandstones are mainly fine grained, quartzose, and clean; the claystones are carbonaceous. Siliceous tree stumps protrude from some of the seams and are still in an upright growing position.

The Eureka Sound Formation is almost flat lying throughout the area and dips rarely exceed 10°. The formation has formed a relatively thin, extensive mantle along the axes of the Vendom and Schei Synclines. The Eurekan Orogeny has disrupted the continuity of this mantle and has resulted in the formation of several grabens and block-faulted structures throughout the area. Very little coarse sediment was observed in the Eureka Sound Formation

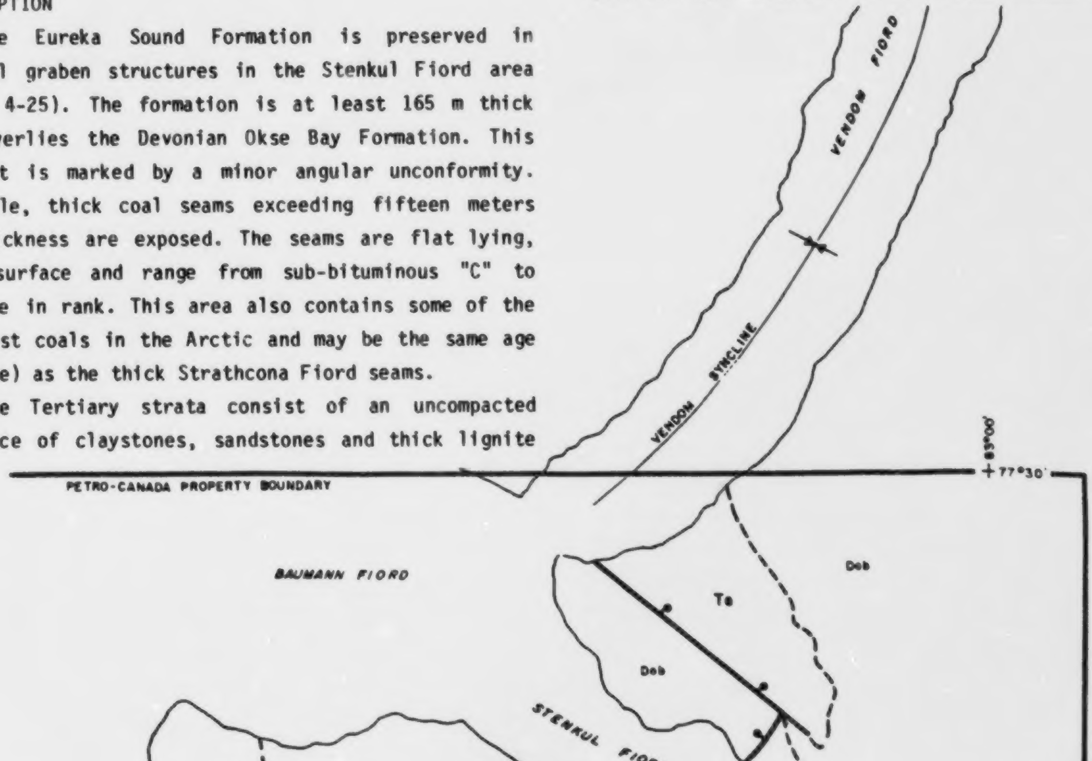

FIGURE 4-25: Schematic geology of Stenkul Fiord area (from DIAND assessment report 062157)

and on this basis it is unlikely the Tertiary strata was deposited while the faults were still active. It has been suggested that the grabens may be related to a major rifting episode south and east of Ellesmere Island. The Eurekan Orogeny has resulted in the area being compressed, uplifted and block-faulted, splitting the coal-bearing strata into separate blocks (Fig. 4-25).

CURRENT WORK AND RESULTS

1982:

During a short reconnaissance of the Stenkul Fiord area a total of seven coal seams were sampled. The individual coal seams ranged from one to over ten meters in thickness. The seams are arranged in multiple layers creating zones up to 25 meters thick. In this area the seams contained visible claystone partings. Ash values ranged from 3 to 20 percent but averaged 12 percent on an as-received basis. Sulphur content was less than 0.5 percent and fixed carbon ranged from 16 to 30 percent on an as received basis. The calorific value varied from 16,000 to 20,000 KJ/kg on a moist, mineral-matter-free basis. The proximate analysis indicates a rank of sub-bituminous "C" to lignite for the seams in this area. An average proximate analysis was produced for the eight seams and has been compared to an Estevan lignite.

As Received	Stenkul Fiord	Estevan Lignite
Moisture	27.90	28.50
Ash	11.90	11.40
Volatile Matter	28.60	27.40
Fixed Carbon	31.60	32.70
Sulphur	0.29	0.50
Calorific Value (KJ/kg)	17,000	16,500
(BTU)	7,311	7,096

The vitrinite reflectances indicated all the samples were lignite in rank. The maceral analysis of the seams was similar to the coals of Strathcona Fiord. Vitrinite comprises about 30 to 40 percent of the samples. The samples were relatively rich in exinitic materials, i.e., spores and resins. Again the petrographic ash was high as compared to the ash calculated from the proximate analysis. Either some macerals were misidentified as ash or some of the minerals volatize during combustion. The latter, however, should show up in higher than expected volatile contents. This was not seen in the proximate analyses.

1983:

The 1983 field program consisted of detailed mapping, measuring and sampling stratigraphic sections of coal beds and the enclosing Eureka Sound Formation. Much of this work is the basis of a MSc thesis by Riediger (1985).

The 1983 work confirmed the existence of thick coal seams (up to 10 m thick) and considerable coal resources in the area.

CARVINGSTONE IN THE ARCTIC ISLANDS

Carvingstone is one of three mineral commodities presently being mined in the Canadian Arctic. Its value is greatly enhanced by value added during local secondary processing, i.e., carving. The economic importance of these activities to the northern and national economies is indicated by payments estimated at 10 million dollars, shared among some 2,000 Inuit carvers in 1981. Transportation, wholesaling and marketing costs add an equal or greater value to the final retail value of goods and services. The cash value of these carvings to the Inuit of the Eastern Arctic was exceeded only by Government wages and transfer payments. Carving is in many instances an alternate to unemployment and a source of readily available cash income.

The 1982 economic recession had a devastating effect on the sale and production of Inuit carvings and prints. New initiatives are required to cut costs, improve quality, reduce inventories, and promote an interest and appreciation of Inuit sculptures, if this valuable sector of the Northern economy is to continue to contribute to the welfare and culture of the country (Gibbins, in prep.).

The Resident Geologist's office of the Department of Indian Affairs and Northern Development has been asked from time to time to assist in the exploration and assessment of potential carvingstone. In 1975, DIAND's Geology Section sponsored a report on carvingstone occurrences in Southern Baffin Island (Hogarth, 1975).

In 1981, the Arctic Islands District Geologist was asked to help find new sources of carvingstone in the Cumberland Peninsula area, near the communities of Pangnirtung and Broughton Island. No new sources were located in this area, although several prospective ultramafic and marble outcrops were examined.

Subsequently, the Arctic Islands District Geologist was asked to examine the Mary River-Nuluujaak Mountain area, where some carvingstone was being quarried. During his visit, Phillip Pitseolak, an Inuit carver from Pond Inlet, discovered a new source of excellent quality carvingstone, while prospecting an area of ultrabasic rocks which is shown on Geological Survey of Canada Map 1451A-Icebound Lake (Jackson and others, 1978). The importance of this discovery is demonstrated by the fact that almost all of the carvings currently being created in Pond Inlet, Clyde River and Igloolik are made from rock which came from this site.

Also in 1981, Dr. William Padgham of DIAND and Dr. Rollie Ridler, formerly of Newmont Mining Ltd. discovered and reported carvable soapstone deposits at Baton Lake (200 km north of Yellowknife).

As any resident of the Northwest Territories has the right to 50 tons of stone for his personal use, there is no point to staking and recording mineral claims for carvingstone.

HOARE BAY RECONNAISSANCE

Carvingstone
16 E west half
65-66°N,63°-64°W

REFERENCES

Boas (1885); Jackson (1971); Jackson and Taylor (1972).

LOCATION

The area includes the southeast coast of the Cumberland Peninsula of southeastern Baffin Island (D in Figure 4-1).

HISTORY

Boas (1885) discussed the importance and sources of 'soapstone' in the Cumberland Sound area in general terms.

DESCRIPTION

"Most of the southern half of Cumberland Peninsula is underlain by a thick succession of intensely deformed, layered, metasedimentary rocks and intermediate to basic metavolcanic rocks, possibly of Aphebian age and referred to as the Hoare Bay Group (Jackson 1971). These rocks have been metamorphosed to amphibolite facies and the main lithologies are mica-hornblende-feldspar-quartz schist and gneiss, amphibolite, and biotite-hornblende schist and gneiss. The metavolcanic rocks have pillows and pyroclastic textures preserved locally and have serpentinized ultrabasic intrusions associated with them. Small amounts of oxide and oxide-silicate iron formation, quartzite, and metachert are also present. Minor marble, calc-silicate rocks, and rusty schist outcrop along the northwest margin of the group" (Jackson and Taylor, 1972, p. 1,665).

CURRENT WORK AND RESULTS

In 1982, a number of ultrabasic outcrops, not visited in 1981, were examined for carvingstone potential. Localities for investigation were provided by Dr. G.D. Jackson of the Geological Survey of Canada from unpublished maps. Unfortunately, the only carvable material found was a very small area of talcose rock related to alteration along joint surfaces.

ICEBOUND LAKE RECONNAISSANCE

Carvingstone
37 G south half
71°-71°30'N,76°-80°W

REFERENCES

Gibbins (in prep.); Jackson and others (1978).

LOCATION

The southern half of NTS area 37 G is part of northern Baffin Island. It is about 170 km south of Pond Inlet and 120 km south-southeast of the head of Milne Inlet. There is an abandoned, but serviceable airstrip at Mary River in the western part of the area (C in Figure 4-1).

HISTORY

An excellent source of good quality carvingstone (altered ultrabasic rock) was discovered a few kilometers southeast of the Mary River iron deposits by Phillip Petseolak in 1981 (See introduction and Gibbins, in prep.).

DESCRIPTION

The area is mainly underlain by Archean and/or Aphebian gneisses and granitoids. Metasediments and metavolcanics of the Archean Mary River Group, which includes important areas of iron formation and ultrabasics, are prominent in many parts of the area (Jackson and others, 1978).

Lower Paleozoic carbonates cover much of the southwest corner of the area, southwest of the Central Borden Fault Zone. Large areas of unconsolidated glacial drift are common and a small percentage of the area is covered by permanent icefields.

CURRENT WORK AND RESULTS

In 1982, DIAND's Arctic Islands District Geologist spent one day examining areas of ultrabasics east and west of Mary River. Most of the areas of ultrabasic rocks shown on Geological Survey of Canada Map 1451A (Jackson and others, 1978) were briefly examined, but hydrothermal alteration, necessary to produce carvingstone like at the Pitseolak site, was not observed.

FLEXURE BAY

Carvingstone
68 A/9
$72^{\circ}32'$N,$96^{\circ}25'$W

REFERENCES

Christie (1971); Blackadar (1967).

LOCATION

The area of interest is just south of Flexure Bay on the east coast of Prince of Wales Island. It is about 250 km south of Resolute Bay and 50 km west-southwest of the southwest corner of Stanwell Fletcher Lake (B in Figure 4-1).

HISTORY

There is no known record of stone from the Flexure Bay area being used to produce carvings or utensils.

In the spring of 1982, Paul Qayutinnuaq of Yellowknife produced a small carving from a sample of rock collected by geologists of Monopros Ltd.

DESCRIPTION

A circular area 3 km in diameter, just south of Flexure Bay, is shown as unit 4 - ultrabasic rocks on GSC Map 3-1967 (GSC Bull. 151, Blackadar, 1967). A more recent map (GSC Open File 66, Christie, 1971) shows no evidence of ultramafic rocks in this area.

CURRENT WORK AND RESULTS

In 1983, the area was examined by the Arctic Islands District Geologist and Levi Nunqaq, an Inuk carver from Resolute Bay. Field observations showed that all of the outcrop in the area mapped as unit 4 is granitic gneiss with some altered mafic lenses and locally abundant green to dark-green chlorite and epidote. However, a few small pieces (less than 25 cm diameter) of altered ultramafic rock were found in the banks of two westerly-flowing creeks near the western boundary of the area shown as unit 4, and several smaller pieces (less than 10 cm diameter) were found at a few locales along a prominent ridge that marks the western limit of 'unit 4' outcrop. The softness of the boulders and their limited distribution precludes long-distance glacial or fluvial transport. These soapstone boulders seem to have a relatively high talc and chlorite content with minor serpentine. The rock is fairly soft and easily carved, it takes a mediocre to fair polish and is black to dark-green or grey in colour. The site has fairly good accessibility, but the limited quantity of large pieces, coupled with the low demand for stone in the nearest community, Resolute Bay, indicates that this locale has minor economic significance.

SAVAGE POINT

Carvingstone
16 A/9,16
$72^{\circ}45'$N,$96^{\circ}33'$W

REFERENCES

Christie (1971); Blackadar (1967).

LOCATION

Savage Point is on the northern tip of a small, but prominent peninsula about mid-way along the east coast of Prince of Wales Island. It is about 225 km south of Resolute Bay and 50 km west of Stanwell Fletcher Lake.

HISTORY

Local Inuit report that a nearby site, exposed only at low tide, has provided stone for stone lamps (personal communication).

DESCRIPTION

Savage Point is characterized by steep cliffs along its north and east shore. These are due to a thick diabase sill that caps most of the peninsula.

CURRENT WORK AND RESULTS

A brief visit to the Savage Point area confirmed the mapping of Christie (1971), i.e., a thick diabase sill capping Helikian red shale, conglomerate-sandstone and stromatolitic dolomite (rather than the basement gneisses shown on GSC Map 3-1967)(Blackadar, 1967). Many small pieces (less than 3X10X10 cm) of bright yellow-green serpentinite presumably formed by the metamorphism of dolomites by the diabase sill were observed amongst the beach pebbles. Recent and Quaternary beach deposits or large blocks of talus cover most of the base of the steep diabase cliffs, making it difficult and potentially dangerous to prospect or quarry the most favourable zone.

It was impossible to examine the intertidal area during my visit,as the area was still covered with sea ice.

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CHAPTER 5: KEEWATIN REGION

by P.J. Laporte, District Geologist,
Keewatin Region, Northern Affairs Program,
Yellowknife, N.W.T.

INTRODUCTION

In 1982 and 1983, the District Geologist, Keewatin Region, monitored mineral exploration in the mainland part of the Northwest Territories east of 102°W longitude. The Keewatin Region is part of the Churchill Structural Province of the Canadian Shield. It is underlain by Archean and Aphebian volcanic, sedimentary and plutonic rocks deformed and metamorphosed during the Hudsonian Orogeny. Shallow-dipping to flat-lying, unmetamorphosed to slightly metamorphosed rocks of late Aphebian and Helikian age locally overlie the metamorphic complex south and west of Baker Lake (Fig. 5-1).

In this report, the Keewatin Region has been subdivided into three main areas on the basis of geology and exploration targets (Fig. 5-1): the Ennadai Lake-Rankin Inlet area, the Baker Lake-Thelon River area and the Chantrey Inlet-Wager Bay area. Most of the properties in the region encompass, or are adjacent to, lakes on which fixed-wing aircraft can land.

CARIBOU PROTECTION MEASURES

The 1982 Caribou Protection Measures, appended to the land use permits issued in the Keewatin, were essentially the same as the 1981 measures (Laporte, 1984). Holders of land-use permits were forbidden to operate within the Caribou Protection Areas (Fig. 5-2) between May 15 and July 31. However, operations begun before May 15 could be continued, upon approval by the Land Use Inspector, as long as caribou cows were not approaching the area of operation. If cows approached the area of operation, the permittee was to suspend operations and evacuate all personnel except those required for maintenance and protection of the camp facilities. Also, the Land Use Inspector could allow operators to occupy, before July 31, those parts of the Caribou Protection Areas that the caribou cows and calves were not expected to use.

If calving occurred outside the Caribou Protection Areas, permittees were to suspend operations in the areas occupied by cows and calves between May 15 and June 30. Permittees also had to suspend airborne geophysical surveys and the slinging of fuel or equipment by helicopter in the vicinity of cow-calf aggregations.

Permittees were forbidden to locate operations and to conduct activities, such as airborne surveys and the movement of equipment, which would interfere with migrating cows. Between May 15 and September 1, permittees could not diamond drill within 5 km of any Designated Crossing and could not construct a camp, cache fuel or conduct any blasting within 10 km of any Designated Crossing.

After public review of the Caribou Protection Measures in early 1983, the protection area boundaries and the timing of the measures were altered (Fig. 5-2). Operations were to be suspended within the protection area between May 15 and July 15 instead of between May 15 and July 31. Operations outside the protection area but in areas occupied by cows and calves were to be suspended between May 15 and July 15 instead of between May 15 and June 30. Blasting and the operation of all-terrain vehicles were added to the activities to be suspended in the vicinity of cow-calf aggregations.

ENNADAI LAKE-RANKIN INLET AREA

In this area, a complex of granitic gneisses, migmatites and intrusions enclose northeast-trending belts of Archean volcanic flows and pyroclastics, slate, greywacke, conglomerate and minor iron-formation. These Archean rocks are unconformably overlain by Aphebian conglomerate, greywacke, quartzite, orthoquartzite, argillite and dolomite which, to the east, are interbedded with and overlain by basaltic flows. During the Hudsonian Orogeny, the Aphebian and Archean rocks were folded about northeasterly axes and intruded by quartz monzonite and granodiorite. Fluorite-bearing granite intruded the Archean-Aphebian complex during the Paleohelikian.

Volcanogenic massive sulphide and precious metal deposits within the Archean volcano-sedimentary assemblage are the main targets of mineral exploration in this area.

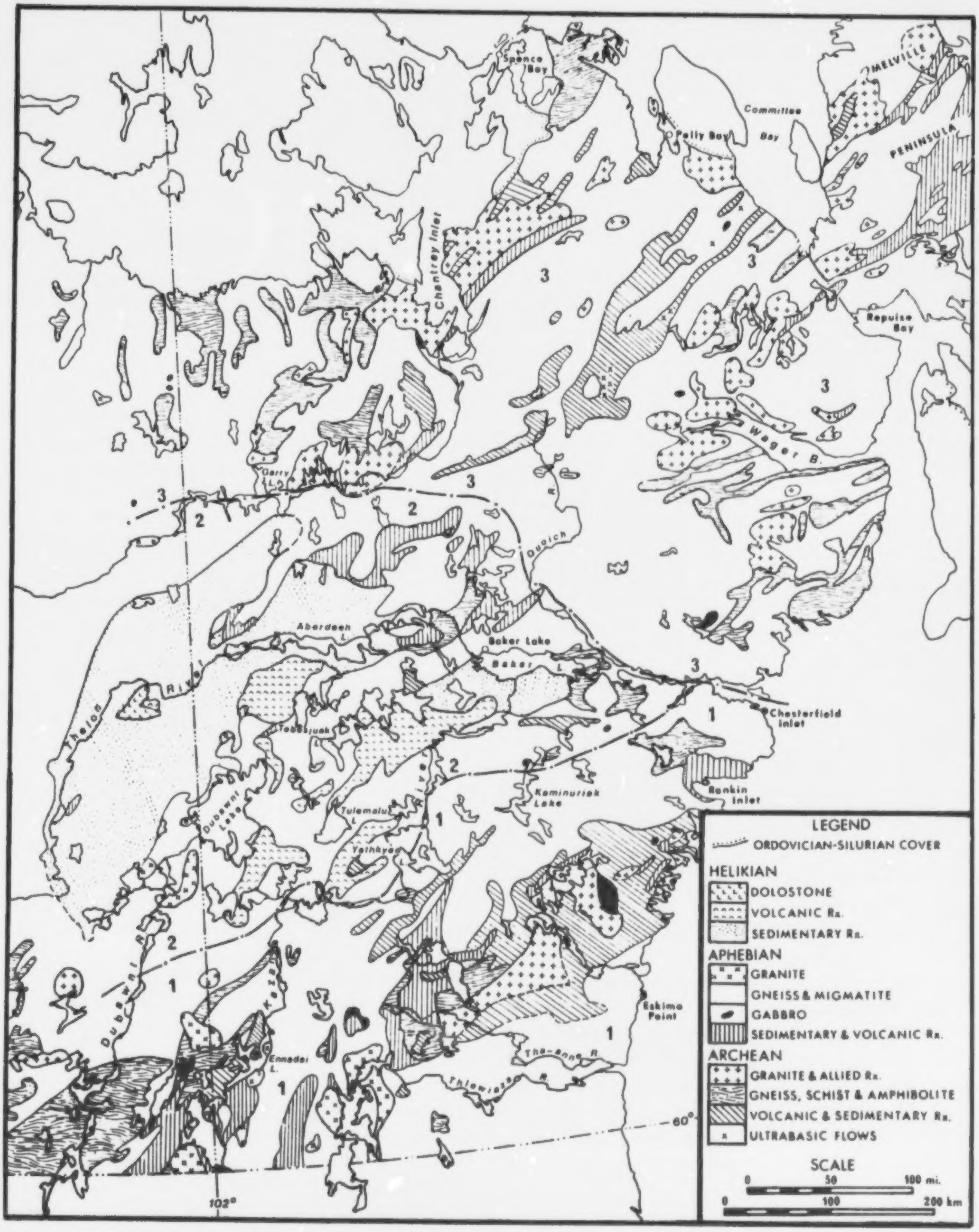

Spence Bay
MELVILLE
PENINSULA
Committee Bay
Pelly Bay
Chantrey Inlet
Repulse Bay
Wager B.
3
3
3
3
3
3
Garry L.
2
2
2
2
Quoich
Aberdeen L.
Baker Lake
Baker L.
Thelon River
Chesterfield Inlet
Tebesjuak
Kaminuriak Lake
Rankin Inlet
Tulemalu L.
Yathkyed
Dubawnt Lake
Dubawnt R.
Kazan
Ennadai L.
Eskimo Point
Tha-anne R.
Thlewiaza R.
1
1
1
1
1
60°
102°
LEGEND
ORDOVICIAN-SILURIAN COVER
HELIKIAN
DOLOSTONE
VOLCANIC Rx.
SEDIMENTARY Rx.
APHEBIAN
GRANITE
GNEISS & MIGMATITE
GABBRO
SEDIMENTARY & VOLCANIC Rx.
ARCHEAN
GRANITE & ALLIED Rx.
GNEISS, SCHIST & AMPHIBOLITE
VOLCANIC & SEDIMENTARY Rx.
x ULTRABASIC FLOWS
SCALE
0
50
100 mi.
0
100
200 km

FIGURE 5-1: Geology map of the Keewatin Region showing subdivisions: 1) Ennadai Lake-Rankin Inlet area 2) Baker Lake-Thelon River area 3) Chantrey Inlet-Wager Bay area.

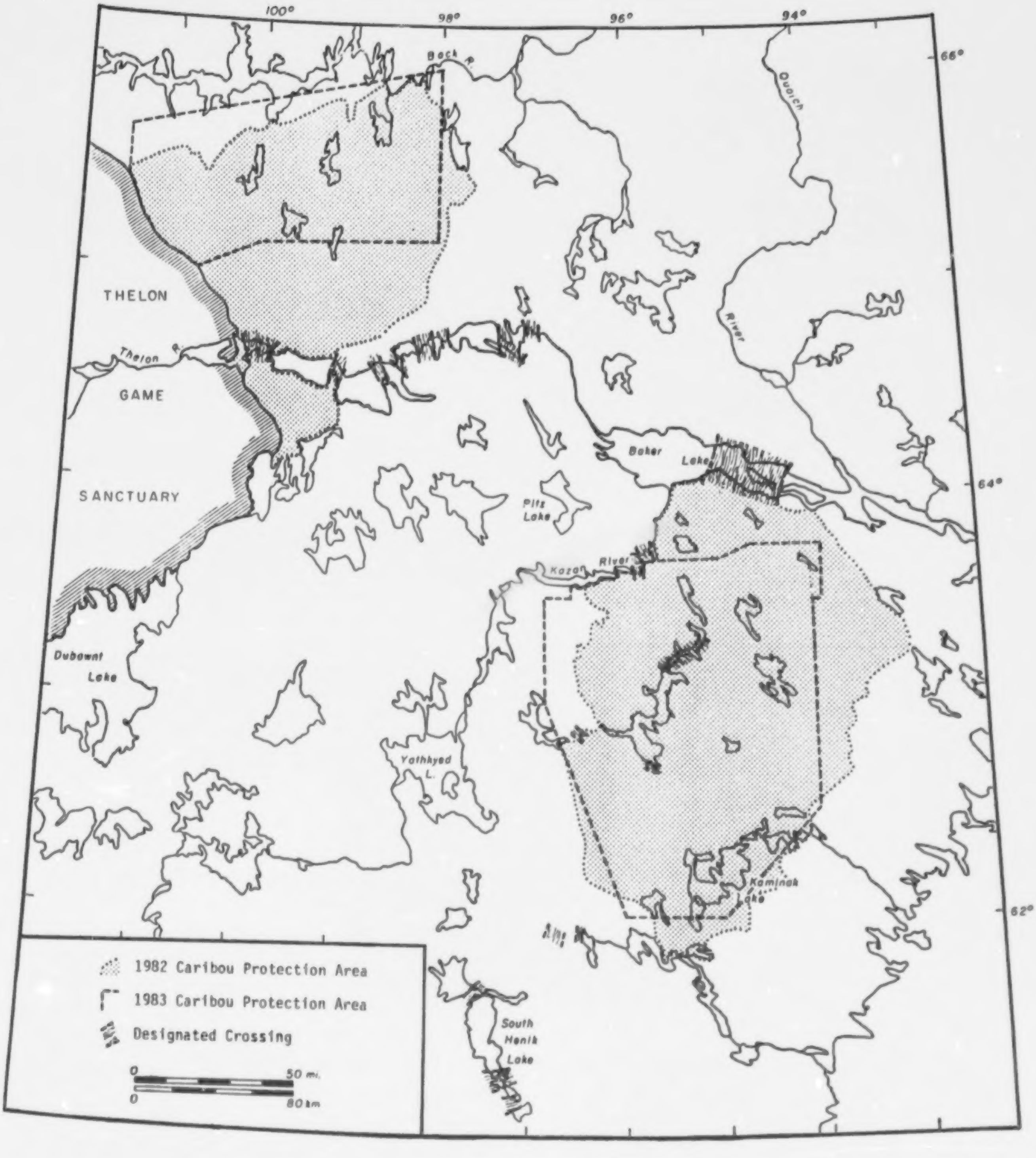

100°
98°
96°
94°
66°
64°
62°
Back R.
Quoich
River
THELON
Thelon R.
GAME
SANCTUARY
Baker
Lake
Pitz
Lake
Kazan
River
Dubawnt
Lake
Yathkyed
L.
Kaminak
Lake
South
Henik
Lake
1982 Caribou Protection Area
1983 Caribou Protection Area
Designated Crossing
0
50 mi.
0
80 km

FIGURE 5-2: Extent of areas affected by the Caribou Protection Measures in 1982 and 1983.

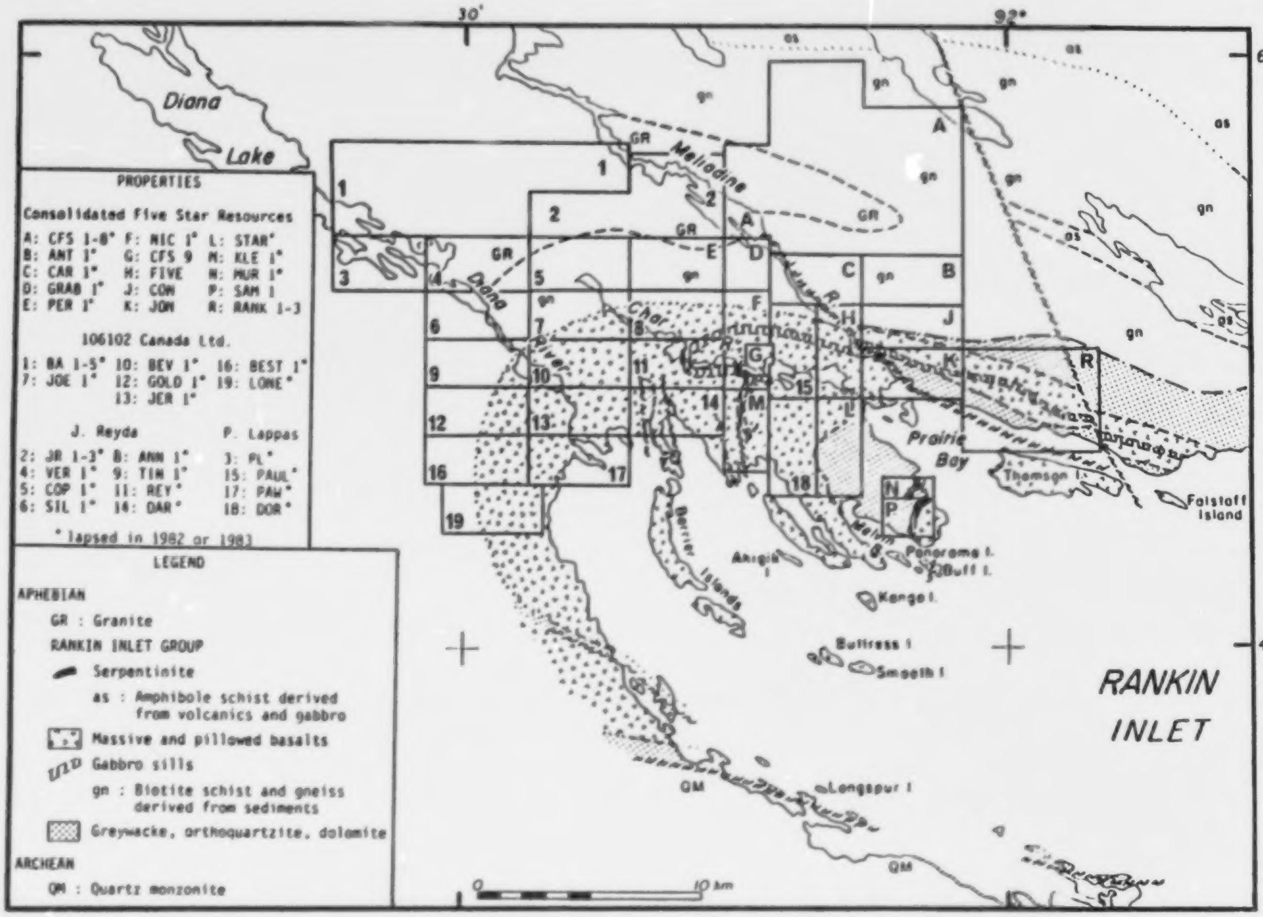

30'
92°
63°
45'
Diana Lake
PROPERTIES
Consolidated Five Star Resources
A: CFS 1-8* F: NIC 1* L: STAR*
B: ANT 1* G: CFS 9 M: KLE 1*
C: CAR 1* H: FIVE N: MUR 1*
D: GRAB 1* J: CON P: SAM 1
E: PER 1* K: JON R: RANK 1-3
106102 Canada Ltd.
1: BA 1-5* 10: BEV 1* 16: BEST 1*
7: JOE 1* 12: GOLD 1* 19: LONE*
13: JER 1*
J. Reyda
2: JR 1-3* 8: ANN 1* 4: VER 1* 9: TIM 1* 5: COP 1* 11: REY* 6: SIL 1* 14: DAR*
P. Lappas
3: PL* 15: PAUL* 17: PAW* 18: DOR*
* lapsed in 1982 or 1983
LEGEND
APHEBIAN
GR : Granite
RANKIN INLET GROUP
Serpentinite
as : Amphibole schist derived from volcanics and gabbro
Massive and pillowed basalts
Gabbro sills
gn : Biotite schist and gneiss derived from sediments
Greywacke, orthoquartzite, dolomite
ARCHEAN
QM : Quartz monzonite
Meliadine
Diana River
Char
Prairie Bay
Thomson I.
Falstaff Island
Barrier Islands
Panorama I.
Bluff I.
Buttress I
Smooth I
Longspur I
RANKIN INLET
GR
gn
as
QM
0
10 km

FIGURE 5-3: Geology and claims, Rankin Inlet area (geology from Laporte, 1983b).

RANKIN INLET CLAIMS

Consolidated Five Star
Resources Ltd.
10250 - 101 St.
Edmonton, Alta., T5J 3P4

Copper,Nickel
55 J/13; K/16

REFERENCES

Heywood (1973); Laporte (1974a, b, 1983b, 1984).
DIAND assessment report: 081583.

PROPERTY

The properties staked in the Rankin Inlet area are listed in Figure 5-3.

LOCATION

The claims cover the north shore of Rankin Inlet (Fig. 5-3).

HISTORY

A copper-nickel deposit on the south shore of Prairie Bay was discovered in 1928 and mined by North Rankin Nickel Mines Ltd. from 1957 to 1962. The company extracted 9,660 tonnes of nickel and 2,630 tonnes of copper from the 368,093 tonnes of ore mined.

From 1969 to 1972, the Rankin Nickel Syndicate explored the area with airborne and ground geophysical surveys, geological mapping and diamond drilling of conductors but failed to outline metal concentrations of interest (Laporte, 1974a, b).

Most of the claims listed in Figure 5-3 were staked in late 1980 and early 1981. The RANK claims were added to the property in early 1982 and all but the CAR, CON, FIVE, JON, RANK and SAM claims lapsed in late 1982 and early 1983. Prospecting and sampling of the gabbro sill north of Prairie Bay indicated it could possibly host disseminated copper-nickel deposits (Laporte, 1984).

DESCRIPTION

The area is underlain by rocks of the Aphebian Rankin Inlet Group (Laporte, 1983b). The group consists of greywacke with minor conglomeratic greywacke, quartzite and dolomite overlain by massive and pillowed basaltic flows. Gabbro sills intrude the sediments near the base of the volcanic sequence and three serpentinite sills, one of which hosted the North Rankin Nickel Mines Ltd. orebody, outcrop at the base of the volcanic pile. The sediments are in fault contact with quartz monzonite along the south shore of the inlet and are intruded by a granite pluton to the northwest.

Two periods of folding affected the Rankin Inlet Group rocks. First-generation recumbent isoclinal folds with northwest-trending axial planes formed through gravitational sliding. Second-generation folds are symmetrically disposed about the axis of the granitic intrusion and have east-southeast-trending and near-vertical axial planes. Metasomatic alteration accompanied the intrusion of both the granitic rocks and serpentinite.

CURRENT WORK AND RESULTS

Mapping and sampling of the eastern extension of the gabbro sill north of Prairie Bay in 1982 confirmed its potential to host copper-nickel deposits.

BANNOCK LAKE SHOWING

Silver Chief Minerals Ltd.	Gold
1570, 340 - 12th Ave., SW	55 K/6
Calgary, Alta., T2R 1L5	62°23'N,93°18'W

REFERENCES

Heywood (1973); Laporte (1974a, b, 1976).

DIAND assessment reports: 017084, 080448, 081688.

PROPERTY

JA 1-2 and SC 1-2	55 K/6

LOCATION

The property extends east from the east shore of Maze Lake to north of Whiterock Lake (Fig. 5-4).

HISTORY

Gold was discovered in the Bannock Lake area by prospectors R. Maloney and P. McLeod in 1961 while exploring Prospecting Permit 17 held by North Rankin Nickel Mines Ltd. The area was reportedly staked in 1938 by E. Connolly but no record of this staking remains.

Prospecting Permit 17 was relinquished in 1962 and the area was acquired as Prospecting Permit 202 by Husky Oil Ltd in 1970 (Laporte, 1974a, b). One sample was collected in the vicinity of the Bannock Lake Showing during the prospecting of anomalies detected by airborne surveys but contained no gold. The permit expired in April, 1973.

The area was staked as the DEB 1-5 and EVE 1-6 claims by R. Kasner and E. Bazinet for D. Hurd in June, 1973. A number of trenches were blasted in the showing at that time (Laporte, 1976). The last of the DEB and EVE claims lapsed in 1977.

Claims JA 1-2 and SC 1-2 were staked for Silver Chief Minerals Ltd. in March, 1981. The JA claims lapsed in 1983.

DESCRIPTION

The claims cover the northeastern end of a synclinorium of Hurwitz Group Kinga Formation orthoquartzite and the overlying Ameto Formation slate, mudstone and volcanics. These rocks are underlain to the northwest and northeast by Archean mafic volcanics of the Kaminak Group. Metasediments of the Kaminak Group outcrop at the contact between the Archean volcanics and Aphebian orthoquartzite south of Bannock Lake and at the contact between the volcanics and intrusive Archean quartz diorite to granodiorite to the east.

The Kaminak Group metasediments south of Bannock Lake are impure quartzite and grit which grade into conglomerate containing well-rounded granitic boulders up to 76 cm in diameter. The northeast-trending sediments are cut by north-northwest-trending faults, and to the east, are in fault contact with basaltic flows and diorite.

Two gold-bearing zones were outlined in 1961. In Zone 1, a discontinuous quartz vein up to 1.5-m-thick dips 60°E in a poorly developed shear zone in conglomerate. Zone 2, 800 m to the southeast, is a rusty-weathering shear zone trending 60° in conglomerate, basalt and diorite. A 1.5-m-wide quartz vein dipping 80°E in the shear zone contains gold and, locally, concentrations of sulphides. Samples from the Bannock Lake Showing collected in 1961 contained 132 and 6.5 ppm Au. Grab samples collected from trenches by D. Hurd in 1973 contained tr. to 57 ppm Au. Visible gold was removed from 6 of the 20 samples collected in 1973 before assaying.

CURRENT WORK AND RESULTS

The claims were prospected in 1982. Quartz and quartz-carbonate veins were sampled and found to contain up to 4.2 ppm Au over 1.5 m.

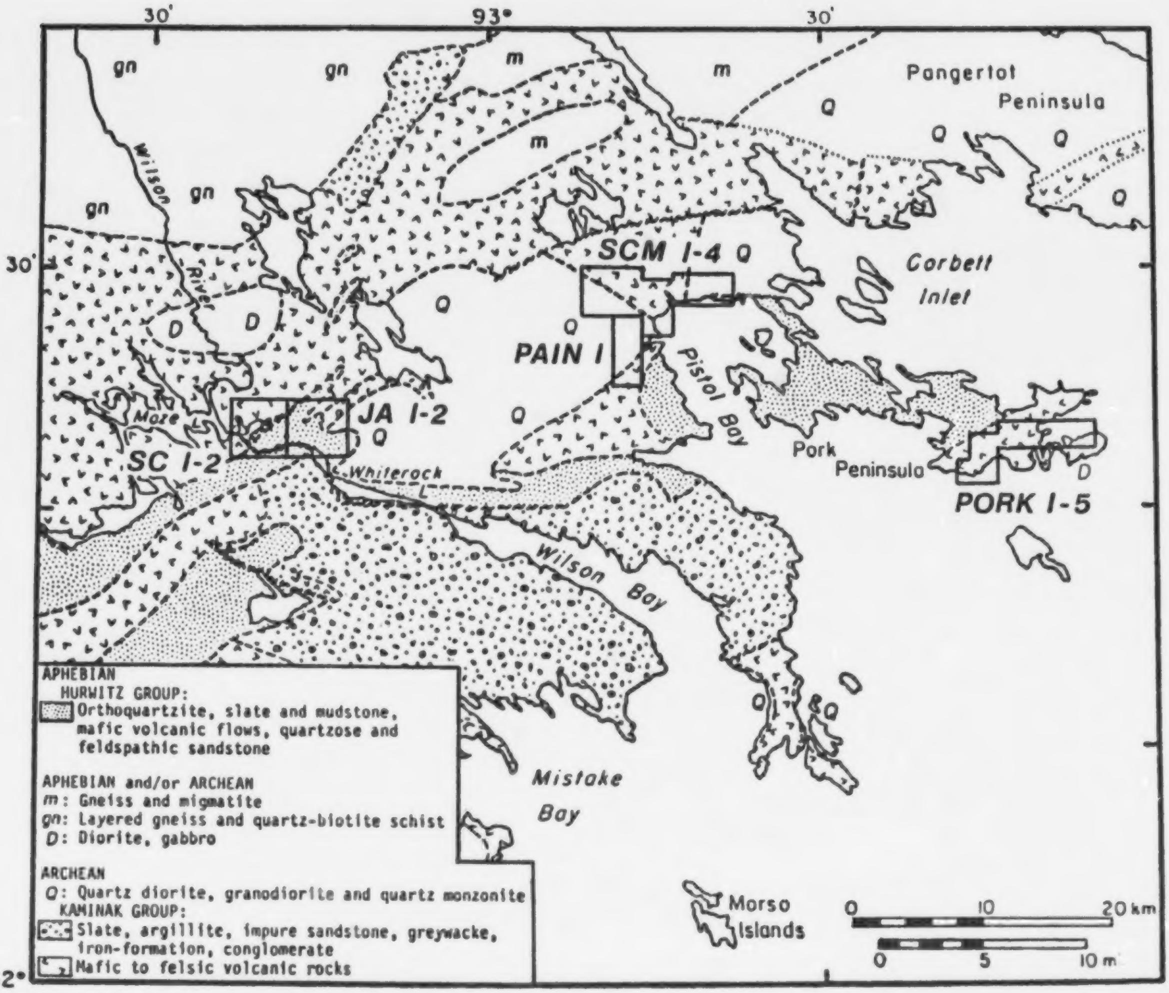

30'
93°
30'
30'
62°
gn
m
Q
D
Pangertot Peninsula
Wilson River
Maze
SCM 1-4
PAIN 1
JA 1-2
SC 1-2
PORK 1-5
Corbett Inlet
Pistol Bay
Pork Peninsula
Whiterock
Wilson Bay
Mistake Bay
Morso Islands
0 10 20 km
0 5 10 m
APHEBIAN
HURWITZ GROUP:
Orthoquartzite, slate and mudstone, mafic volcanic flows, quartzose and feldspathic sandstone
APHEBIAN and/or ARCHEAN
m: Gneiss and migmatite
gn: Layered gneiss and quartz-biotite schist
D: Diorite, gabbro
ARCHEAN
Q: Quartz diorite, granodiorite and quartz monzonite
KAMINAK GROUP:
Slate, argillite, impure sandstone, greywacke, iron-formation, conglomerate
Mafic to felsic volcanic rocks

FIGURE 5-4: Geology and claims, Pistol Bay-Maze Lake area (Geology from Heywood, 1973).

PISTOL BAY CLAIMS

Silver Chief Minerals Ltd.	Gold, Copper
1570, 340 - 12th Ave., SW	55 K/7,10
Calgary, Alta., T2R 1L5	62°28'N,92°45'W

REFERENCES

Heywood (1973), Laporte (1974a, b).

DIAND assessment reports: 017084, 019508, 019834, 081688.

PROPERTY

PAIN 1 and SCM 1-4 55 K/7,10

LOCATION

The claims extend northwest from Pistol Bay on the west shore of Hudson Bay (Fig. 5-4).

HISTORY

North Rankin Nickel Mines Ltd held area 55 K/7 as Prospecting Permit 18 from April, 1961 to April, 1963. Prospecting in 1961 outlined a number of arsenopyrite concentrations, gossan zones and quartz veins which were trenched and sampled (Fig. 5-5). Twenty-five claims were staked in the area by the company.

The area was restaked as the MAR claims in 1969 for Maroubra Holdings Ltd and Whale Cove Copper Mines Ltd. Trenching and sampling of gossan zones was done in 1969 and 1970 (Laporte, 1974a). Five Star Petroleum and Mines Ltd acquired some of the MAR claims in 1971 and added the BEST, BM, CAP, FAR, JER and ORE claims to the property in 1971 and 1972.

A ground EM survey was done in 1971 and a magnetic survey in 1972. Eight holes totalling 301.4 m were drilled to probe 4 conductors and 1 showing in 1972. Four holes totalling 106 m and 6 trenches were blasted to investigate gossan zones on the JER claims and 3 holes totalling 32 m were drilled on the FAR claims in 1972 (Laporte, 1974b).

Claims PAIN 1 and SCM 1-4 were staked for Silver

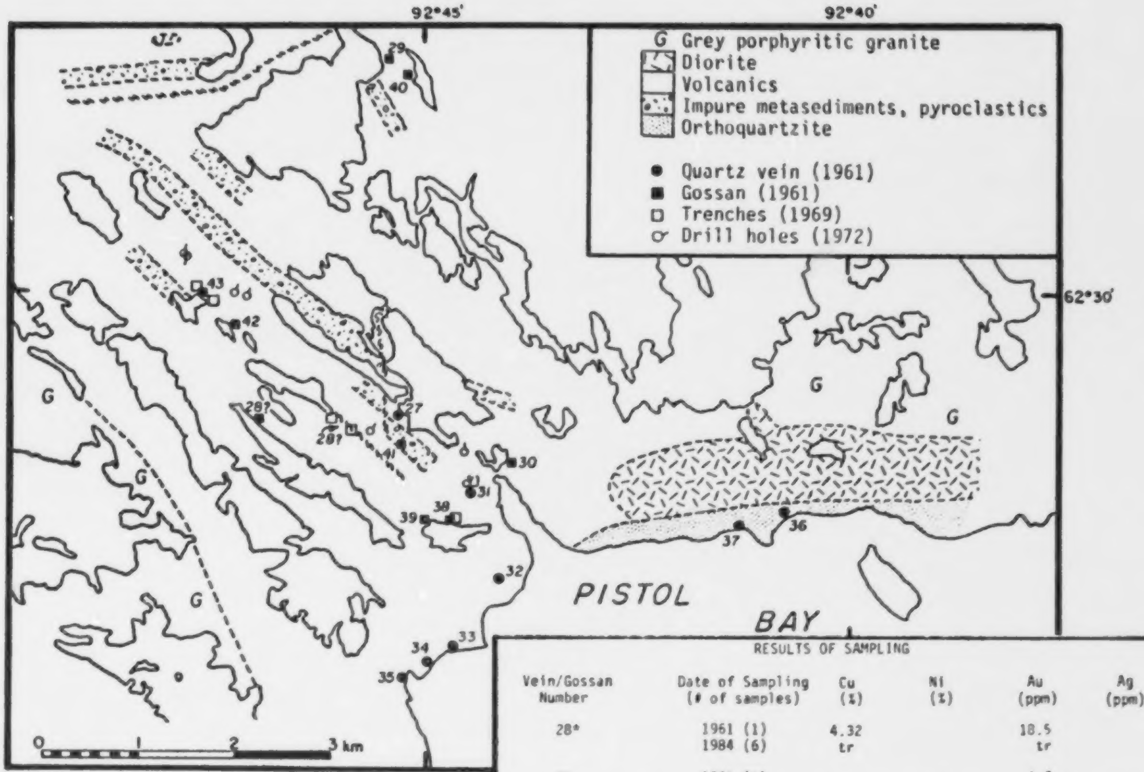


FIGURE 5-5: Mineral occurrences, Pistol Bay area (Geology from Assessment Report 017084).

Chief Minerals Ltd. in March, 1981 and all but SCM 2 lapsed in 1983.

DESCRIPTION

A 6- to 11-km-wide belt of Archean Kaminak Group mafic volcanic rocks intruded to the east and west by quartz diorite to granodiorite extends north from Pistol Bay. Six km north of the bay, an east-trending fault separates the volcanic belt and adjacent plutons to the south from a much more extensive sequence of north-trending volcanics (Fig. 5-4). Orthoquartzite of the Hurwitz Group Kinga Formation is in fault contact with the volcanics and intrusions along the north shore of Pistol Bay.

The two prospectors who explored the area in 1961 sampled 17 gossans and quartz veins (no. 27 to 43 in Fig. 5-5). Trenching in 1969 explored gossan zones on claims MAR 79 (gossan 28?), MAR 95 (gossan 43) and MAR 15 and 16 (gossan 38/C Mtn Zone) and two quartz veins on claims MAR 15 (vein 31) and MAR 43 (vein 34). Field work by the author in 1984 indicates that the prospectors active in 1961 consistently misidentified pyrrhotite as arsenopyrite.

RESULTS OF SAMPLING

Vein/Gossan Number		Date of Sampling (# of samples)	Cu (%)	Ni (%)	Au (ppm)	Ag (ppm)
28*		1961 (1)	4.32		18.5	
		1984 (6)	tr		tr	
31		1961 (1)			1.7	
	trench #8	1969 (4)	1.68-3.84	0.11-1.23	tr-16.4	25.3-61.6
		1971 (1)	2.89	0.11		
		1984 (2)	2.00,5.90	0.01,0.08	tr, 0.4	
	trench #9	1971 (1)	1.65	0.15		
33		1961 (1)			2.4	
34		1961 (2)			19.2,39.7	
		1969 (3)	0.02-0.07	0.02-0.09	3.4-44.5	13.0-54.7
		(1)	0.68			
		1984 (1)	tr	0.11	20.6	
38	C Mtn #1	1969 (3)	0.07-0.21	tr-0.08		
	C Mtn #2	1969 (3)	0.09-1.85	0.04-0.09	tr-10.6	28.0-36.6
		1971 (1)	0.80	0.005		
		1984 (2)	0.02,0.08	0.01	tr	
MAR 79	trench #4	1971 (1)	0.48	0.08		
		1984 (3)	0.13-0.16	0.02	tr	1.71
	trench #5	1969 (3)	0.90-1.48	0.04-0.09		
	trench #6,7	1969 (3)	0.17-0.68	0.04-0.12		

* Gossan #28 was probably misplotted on the 1961 map, no gossan was found trenched at that location in 1984. The gossan sampled in 1961 is probably the one on claim MAR 79.

The holes drilled on EM anomalies in 1972 encountered disseminated pyrite, pyrrhotite and chalcopyrite in metavolcanics. Metal content was generally less than 0.1% Cu and 0.05% Ni with the best result being 0.48% Cu over 0.61 m. The hole drilled under trench 9 on claim MAR 15 intersected 4 quartz veins 1.5 to 2-m-wide in metavolcanics. One of the quartz veins encloses a 15-cm-wide band of 40% pyrrhotite and minor chalcopyrite and contained 0.18% Ni, 0.09% Cu and 6 ppm Ag over 0.61 m.

CURRENT WORK AND RESULTS

The zones explored in 1970 were prospected by K.G. Rose in 1982. The C Mtn Showing is described as a 305- to 400-m-long rusty zone commonly less than

0.6 m but up to 3-m-wide. The zone is in volcanics and resembles banded sediments. A second rusty zone in volcanics outcrops at the west end of the lake. No samples were collected from either of these zones as no sulphides were recognized.

Quartz vein 31 explored in 1970 with trenches 8, 9 and 10 extends at most 450 m and consists of white quartz and carbonate containing patches of iron sulphides. Samples collected from the trenches in 1982 contained trace to 9 ppm Au, trace to 3 ppm Ag, trace to 0.46% Cu and trace to 0.06% Ni.

Samples were also collected from a discontinuous quartz-carbonate vein in a shear zone in the volcanics 200 to 300 m northwest of Pistol Bay (vein 32?). The quartz and carbonate occur as patches up to 3 m wide and 30 m long. One grab sample of pyrite-bearing quartz in a 1.5-m-wide quartz-carbonate vein contained 2 ppm Au.

PORK PENINSULA PROJECT

Canadian Nickel Co. Ltd.	Gold
Copper Cliff, Ont.	55 K/8
POM 1NO	62°23'N,92°12'W

REFERENCES

Heywood (1973).

DIAND assessment report: 081670.

PROPERTY

PORK 1-5	55 K/8

LOCATION

The claims extend east across the eastern end of Pork Peninsula (Fig. 5-4).

HISTORY

Claims PORK 1 to 3 were staked in 1981 to cover a previously trenched but unreported gold showing on the west side of Pork Peninsula and a pyrite-pyrrhotite-chalcopyrite showing indicated on the published geological map of the Tavani area (Heywood, 1973). Samples collected from the trenches in 1981 contained 3.43 ppm Au over 6.09 m, 2.74 ppm Au over 8.84 m and 3.77 ppm Au over 7.82 m. PORK 4 was added to the property in 1982. PORK 5 was added to the property and PORK 3 lapsed in 1983.

DESCRIPTION

Pork Peninsula consists of a north-facing pile of Archean Kaminak Group pillow basalts and subvolcanic gabbro sills intruded to the southeast by a sheeted dyke complex of diorite and gabbro. The volcanics are overlain, in the northwestern part of the peninsula by orthoquartzite of the Aphebian Hurwitz Group Kinga Formation.

CURRENT WORK AND RESULTS

Geological mapping of the volcanics in 1982 and 1983 outlined a number of minor interflow tuffaceous and exhalative layers 1 to 2 m wide and 10 m to 1 km long and one major layer 25 to 50 m wide extending 7.0 km across the peninsula. The tuffaceous/exhalative bands are foliated sericitic and chloritic schistose zones enclosing chert, iron-formation and quartz-carbonate vein-like aggregations. Concordant to sub-concordant feldspar-porphyry sills intrude the main tuffaceous band and the adjacent volcanic flows. Gold is associated with pyrite-rich parts of the banded oxide iron-formation and pyrite-pyrrhotite concentrations in the quartz-carbonate aggregations. Samples of the main zone contain up to 7.58 ppm Au over 4.5 m.

VLF and vertical-loop EM surveys outlined one EM conductor associated with the trenched showing and a number of VLF conductors associated with shear zones.

HURWITZ PROJECT

Suncor Inc.	Gold, Uranium
500 - 4th Ave., SW	65 B/15,16; G/1-3, 6-8
Calgary, Alta., T2P 2V5	61°10'N,98°30'W

REFERENCES

Eade (1973, 1974); Eade and Chandler (1975); Laporte (1984).

DIAND assessment reports: 081660, 081708, 081709, 081720, 081761.

PROPERTY

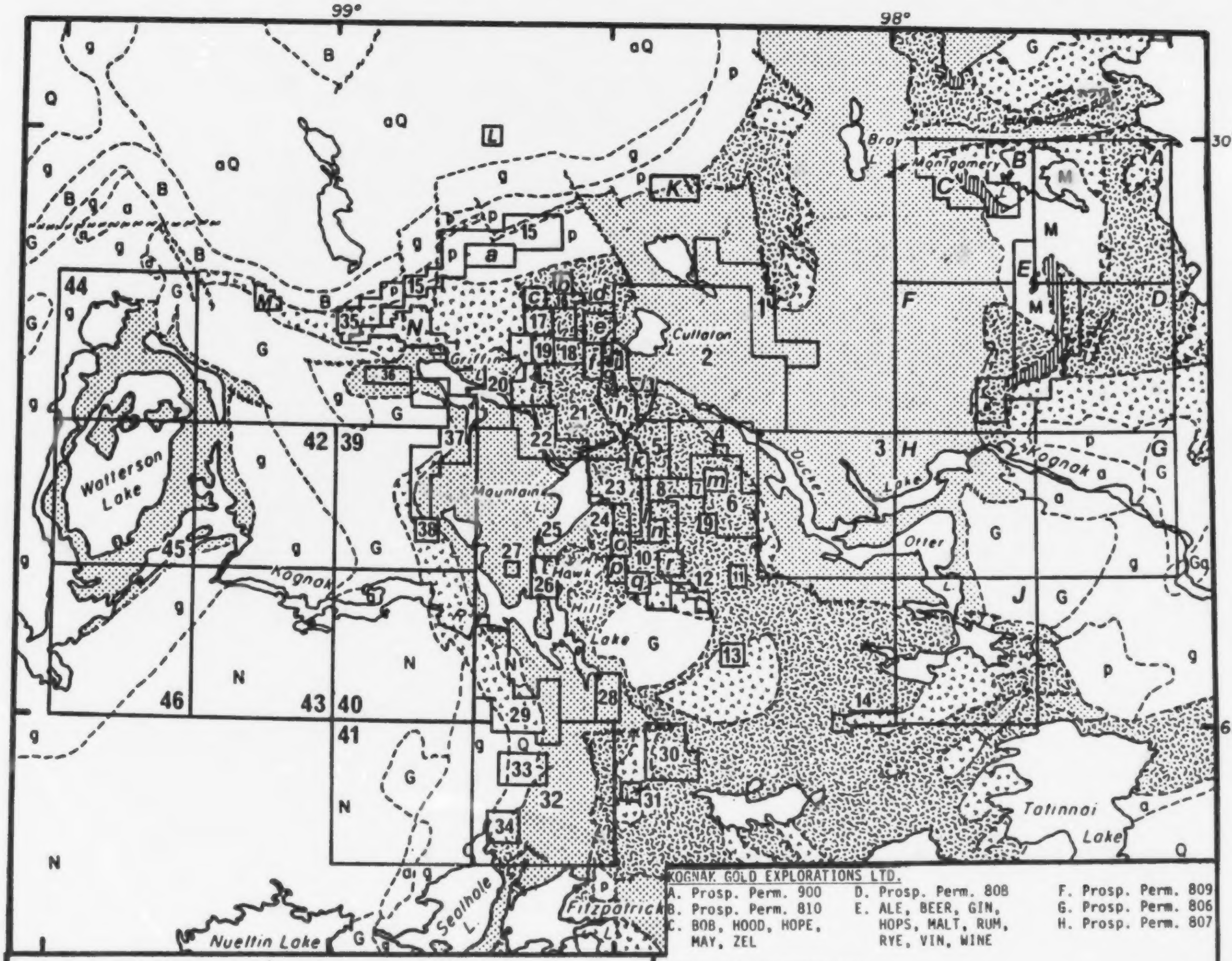
The properties held by Suncor Inc are listed in Figure 5-6.

LOCATION

The Hurwitz Project area extends from the west shore of Watterson Lake to north of Ducker Lake (Fig. 5-6).

HISTORY

Selco Exploration Company Ltd explored the Cullaton Lake and Mountain Lake areas in the 1960's and discovered a number of gold showings. One of these showings, the B-Zone Deposit, was brought into production in 1981 by Cullaton Lake Gold Mines Ltd. The A to P, BECKY, COR, PETE and ROD claims were



HELIKIAN
N: Nueltin Lake porphyritic granite

APHEBIAN
aQ: Quartz monzonite
B: BATE LAKE SEDIMENTS: dolomite, phyllite, arkose, siltstone, paragneiss
▨ HURWITZ GROUP: orthoquartzite, greywacke, conglomerate arkose, dolomite, siltstone, argillite.
M: MONTGOMERY LAKE GROUP: siltstone, arkosic quartzite, greywacke, conglomerate.

ARCHEAN
Ga: Gabbro
Q: Quartz monzonite
G: Granodiorite, massive to foliated
g: Quartzo-feldspathic gneiss, granodioritic gneiss, layered gneiss
HENIK GROUP:
p: Paragneiss, pelitic gneiss
▩ Greywacke, slate, minor iron-formation and volcanic flows
▥ Iron-formation
a: Amphibolite, melanocratic gneiss
⁘ Mafic to felsic volcanic flows and pyroclastics, arenites, ultrabasic flows

KOGNAK GOLD EXPLORATIONS LTD.
A. Prosp. Perm. 900
B. Prosp. Perm. 810
C. BOB, HOOD, HOPE, MAY, ZEL
D. Prosp. Perm. 808
E. ALE, BEER, GIN, HOPS, MALT, RUM, RYE, VIN, WINE
F. Prosp. Perm. 809
G. Prosp. Perm. 806
H. Prosp. Perm. 807

ESSO MINERALS CANADA LTD.
J. Prosp. Perm. 760
K. BANSHEE

DENISON MINES LTD.
L. RICH 1-16

NORANDA EXPLORATION COMPANY LTD.
M. FIVER 1-16
N. GRIF 1, ROY 1-31, STRIDER 1-74

CULLATON LAKE GOLD MINES LTD.
a) Cullaton Lake Project
a. DOVE
b. PAGE
c. CHAS
d. DOC, HAL, SOC
e. COD
f. BO
g. FOX, HUGH, LEW
j. BEA
k. BPB, PEN 3-31
l. JOHN, KAREN, MARIE, MICK, RITA
m. SUN
n. JUDY
o. NOBE
p. RON
q. SHAW
r. LYNNE
b) B-Zone Gold Deposit
h. AIR 1-12, CEP, CORNER, DWE 1-17, GILT 1-15, 17-22, 25-29, MAC, SUE, TAIL

ROYEX STURGEX MINING LTD.
i. MIK 3-5, 11-13

SUNCOR INC.
1. MIKE 1-16
2. COR 1-19
3. Prosp. Perm. 905
4. FRANK
5. KEVIN 1-3
6. PAUL 1-5
7. H
8. H 2
9. G
10. ZAK 1-4
11. E
12. DAY, FRI, 13
13. WED 11
14. BAR 1-2
15. A 1-7
16. RAY 1
17. WED 4
18. SPORT
19. TOO 1-3
20. DON 1-5, O
21. PETE 1-5
22. WED 5-6, 8
23. WED 7, 9-10
24. PETE 6
25. BECKY
26. L 1
27. L 2
28. C 1, 2
29. K 1-8
30. B 1-3
31. B 4
32. Prosp. Perm. 826
33. J 1-2
34. D
35. WED 1-3
36. P
37. ROD 1-5
38. M
39. Prosp. Perm. 828
40. Prosp. Perm. 829
41. Prosp. Perm. 827
42. Prosp. Perm. 830
43. Prosp. Perm. 832
44. Prosp. Perm. 834
45. Prosp. Perm. 831
46. Prosp. Perm. 833

FIGURE 5-6: Geology and properties, Kognak River area (Geology from Eade, 1981a).

staked in 1981 to cover anomalies detected during a 3,560-line-km Tridem, magnetometer and radiometric survey and a reconnaissance geochemical lake water and sediment survey. Prospecting Permits 826 to 834 and the 13, A 3-7, DAY, FRI, SPORT, TOO 1-3, WED 1-11 and ZAK 1-4 claims were acquired in 1982. Prospecting Permits 830 to 834 were relinquished and Prospecting Permit 905 was acquired in 1983. The BAR 1-2, DON 1-5, FRANK 1, H 2-3, KEVIN 1-3, MIKE 1-6, PAUL 1-5, RAY 1-2, SIKSIK and ZAK 5-6 claims were added to the property in 1983.

DESCRIPTION

The eastern part of the area explored is underlain by a north-northwest-trending, 25- to 50-km-wide belt of Archean Henik Group clastic and volcanic rocks flanked by basins of Aphebian Hurwitz Group quartzitic sediments. The clastic component of the Henik Group includes greywacke and slate, metagreywacke, pelitic schist and gold-bearing iron-formation. The mafic volcanic flows and pyroclastics that underlie these clastic rocks outcrop at the edges of the belt.

The prospecting permits to the west overlie a basin of Hurwitz Group sediments centered on Watterson Lake and separated from the basins to the east by intrusions of Nueltin Lake porphyritic granite and Archean granodiorite. The central basin of Aphebian rocks is a synform with a slightly arcuate axis trending south to the west of Mountain Lake. The eastern basin extends from west of Ducker Lake and consists of a number of anticlines and synclines disrupted by east-southeast- and north-northwest-trending faults.

The Hurwitz Group has been divided into 6 formations, all of which outcrop in the area. Conglomerate and greywacke of the basal Padlei Formation are overlain by orthoquartzite and arkose of the Kinga Formation. These are overlain by slate, shale and siltstone of the Ameto Formation, in turn overlain by dolomite, argillite, phyllite and siltstone of the Watterson Formation. The top two units of the Hurwitz Group are the Ducker Formation, consisting of greywacke and siltstone, and the Tavani Formation, an assemblage of arkose and impure quartzite, conglomerate and dolomite. All these rocks are intruded by gabbro sills.

CURRENT WORK AND RESULTS

The newly acquired prospecting permits were explored in 1982 with a 511-sample lake sediment geochemical survey. Prospecting and a 148 line-km helicopter-borne radiometric survey were done on Prospecting Permit 826 and 90 soil samples were collected from Prospecting Permit 828. Anomalies detected and staked in 1981 were explored with a 820-sample lake sediment survey and a 570-sample soil survey, prospecting, mapping of both bedrock and Pleistocene geology, reconnaissance to detailed ground VLF-EM, MaxMin EM and magnetometer surveys and, in a few areas, trenching. Four grids totalling 225.1 line-km were established. Interesting coincident EM, magnetometer and geochemical anomalies were outlined.

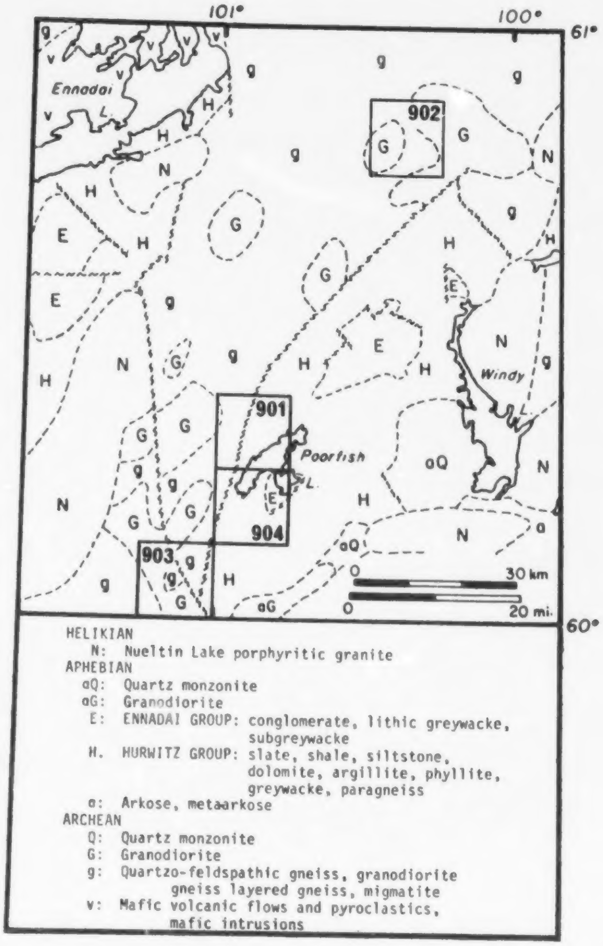

101°
100°
61°
60°
Ennadai L.
Windy L.
Poorfish L.
901
902
903
904
0 30 km
0 20 mi.
HELIKIAN
N: Nueltin Lake porphyritic granite
APHEBIAN
aQ: Quartz monzonite
aG: Granodiorite
E: ENNADAI GROUP: conglomerate, lithic greywacke, subgreywacke
H. HURWITZ GROUP: slate, shale, siltstone, dolomite, argillite, phyllite, greywacke, paragneiss
a: Arkose, metaarkose
ARCHEAN
Q: Quartz monzonite
G: Granodiorite
g: Quartzo-feldspathic gneiss, granodiorite gneiss layered gneiss, migmatite
v: Mafic volcanic flows and pyroclastics, mafic intrusions

FIGURE 5-7: Geology and properties, Windy Lake area (Geology from Eade, 1981a).

Table 5-1

HURWITZ PROJECT DETAILED SURVEYS
DONE IN 1982 (o) or 1983 (●)

CLAIMS	GRIDDING (line-km)	MAP	PROSPECT	SOIL SAMPLING	BOULDER SAMPLING	MAGNETOMETER	VLF-EM	MAXMIN EM	OTHERS
A 1	● (16.1)			o		o●	o●	o	
A 2	● (15.7)			o		o●	o●	o	
A 4-5	o (44.0)		o	o	o				
A 6-7	o (42.5)		o	o	o				
B 1	● (10.8)					o●	●	o●	
B 1, 2	● (17.6)	●				●	●	●	
BAR 2	● (29.7)	●				●	●		
C 1, 2							o		
COR 1	● (13.7)	●				●	●		
COR 3, 6	● (23.2)	●				●	●		
COR 4, MIKE 1, 2	● (49.4)	●				●	●	●	
COR 6	● (6.0)					●	●		
COR 8	● (23.0)	●				●	●		
COR 9, 10	● (19.5)	●				●	●		
COR 18	● (13.5)					●	●		
COR 19	● (7.5)					●	●		
E	● (6.0)	●				●	●		
FRI, DAY, 13		●	●						
G	● (7.0)			o		●	●		
H	● (16.2)	●				●	●	●	1ddh/124m
K 3	● (14.3)	●				●	●		
K 4	● (28.2)	●				●	●	●	
KEVIN 1, 2	● (9.1)	●				●	●		2ddh/248m
O, TOO 3, DON 1-3	● (35.2)	●				●	●	●	
PETE 1, TOO 1-3 (D Zone)	o● (134+)	●				o	o	o	I.P. 1/ddh/1034m
PETE 3	● (35.5)	●				●	●		
PETE 5, WED 10	● (29.6)					●	●		
PETE 6	● (15.8)	●				●	●		
ROD 1-5, M, P				o				o	7 trenches
ROD 2-3, Prosp. Perm. 828	● (39.0)	●				●	●	●	2ddh/246m
TOO 1, WED 1, DON 1 (D Zone North)	● (26.2)					●	●		
WED 2	● (3.0)	●							
WED 5-6, 8-9		o	o			o	o		
WED 7, 10					o				2 trenches
ZAK 1-4	o (4.6)	o	o		o				

In 1983, Prospecting Permit 905 was prospected and 27 grids totalling 510.8 line-km were established and explored with mapping, prospecting, boulder sampling, magnetometer, VLF-EM, MaxMin EM and in one area I.P. surveys (Table 5-1). Twenty-two holes totalling 1,653 m were drilled in four areas.

PROSPECTING PERMITS 901 TO 904

Golden Rule Resources Ltd	Gold
150, 1300 - 8th St., SW	65 C/2,3,7,16
Calgary, Alta., T2R 1B2	

REFERENCES

Eade (1971); Laporte (1974a, 1981).

DIAND assessment reports: 081626, 081627, 081628, 081629.

PROPERTY

Prospecting Permit 904	65 C/2 NW
Prospecting Permit 903	65 C/3 SE
Prospecting Permit 901	65 C/7 SW
Prospecting Permit 902	65 C/16 SW

LOCATION

The permits are west and north of Windy Lake (Fig. 5-7).

HISTORY

The four permits were acquired in 1982. Prospecting Permits 901 and 904 cover parts of the area held as Prospecting Permits 134 and 132 by Yellowknife Bear Mines Ltd from 1969 to 1972. Reconnaissance stream sediment and water geochemical surveys done in 1969 outlined 12 areas of interest, 6 of which were further explored in 1970 (Laporte, 1974a). None of the 6 areas are within the Golden Rule Resources Ltd permits.

The area of Prospecting Permit 901 was held by Uranerz Exploration and Mining Ltd as Prospecting Permit 443 from 1977 to 1978. Airborne radiometric surveys, geological mapping and prospecting of anomalies failed to discover uranium concentrations (Laporte, 1981).

DESCRIPTION

A major arcuate fault trending north-northeast to the west of Poorfish Lake separates an Archean complex of grey biotite granodiorite gneiss, intruded by massive to foliated granodiorite to quartz monzonite, from Aphebian Ennadai and Hurwitz Group rocks. The southern three permits straddle this fault and are underlain to the west by the granodiorite complex and to the east by argillite, phyllite, greywacke, dolomite and paragneiss of the Hurwitz Group. Conglomerate and greywacke of the Ennadai Group outcrop in the northeast corner of Prospecting Permit 904. Prospecting Permit 902 lies entirely within the basement complex.

CURRENT WORK AND RESULTS

A photogeological study and prospecting of magnetic features outlined on published aeromagnetic maps did not detect gold concentrations of interest.

CULLATON LAKE PROJECT

Cullaton Lake Gold Mines Ltd	Gold
400, 111 Richmond St., W	65 G/1,2,7,8
Toronto, Ont., M5H 2G4	

REFERENCES

Eade (1974); Laporte (1983c, 1984).

DIAND assessment reports: 081662, 081666, 081668, 081671, 081674, 081706, 081746, 081747, 081748, 081749, 081750, 081751, 081752, 081753, 081754, 081755, 081756.

PROPERTY

The claims held by Cullaton Lake Gold Mines Ltd and forming part of the Cullaton Lake Project are listed in Figure 5-6.

LOCATION

The claims are near the B-Zone Gold Deposit, west of Cullaton Lake and east of Mountain Lake (Fig. 5-6).

HISTORY

The Cullaton Lake area was first staked by Selco Exploration Company Ltd who, from 1961 to 1967, explored a number of gold showings with prospecting, geological and geophysical surveys, boulder and soil sampling, diamond drilling and trenching. Most of the claims listed in Figure 5-6 were staked for O'Brien Energy and Resources Ltd in 1978 to cover anomalies detected by an EM and magnetometer survey flown in 1977. Magnetometer, self potential and boulder sampling surveys, done on the claims in 1979 and 1980 indicated the presence of gold-bearing iron-formation on most of the claims. The PEN claims were drilled by Cominco Ltd in 1979, but no economic concentrations of gold were outlined (Laporte, 1983c). Cullaton Lake Gold Mines Ltd. acquired the claims in 1980. Claims BEA, DOVE, HUGH and LEW were recorded in June, 1981. Claims BPB and MAC were staked in 1982 and claims DOC, SOC and HAL were acquired in 1983.

DESCRIPTION

The claims are underlain by greywacke, argillite, phyllite, tuff and magnetic iron-formation of the Archean Henik Group. Selco Explorations Company Ltd explored for gold in sulphide-bearing sections of the iron-formation and in fractures in the overlying Aphebian quartzites.

CURRENT WORK AND RESULTS

In 1983, grids were established on the BEA, BO, CHAS, COD, DOVE, FOX, JUDY, LYNNE, NOBE, PAGE, RON and SHAW claims and explored with geological mapping and prospecting, boulder sampling, magnetometer, MaxMin EM and/or VLF-EM surveys. Most claims cover conductors with coincident magnetic anomalies attributed to bands of iron-formation. Ten anomalies were drilled and 3 interesting gold-bearing zones were intersected.

SHEAR LAKE SHOWING

Royex Sturgex Mining Ltd	Gold
800, 65 Queen St., W	65 G/7,8
Toronto, Ont., M5H 2H6	61°18'N,98°30'W

REFERENCES

Eade (1974); Laporte (1983c, 1984).

PROPERTY

MIK 3-5 and 11-13	65 G/7,8

LOCATION

The claims are 1.6 km southwest of Cullaton Lake and 4.8 km north of the Cullaton Lake Gold Mines Ltd adit on the B-Zone Deposit (Fig. 5-6).

HISTORY

The Shear Lake Showing was first staked in September of 1946 and was explored by Hudson Bay Mining and Smelting Ltd and Selco Exploration Company Ltd (Laporte, 1983c). Claims MIK 1-30 were staked in 1972 and transferred to Royex Sturgex Mining Ltd in 1973. Two holes totalling 166.7 m were drilled in

1973 and three trenches were blasted in 1979. Twenty-four MIK claims lapsed in 1978. Geological mapping and trenching in 1981 outlined a 200 m^2 area of potential ore (Laporte, 1984).

In 1982, Cullaton Lake Gold Mines Ltd entered a joint venture agreement with Royex Sturgex Mining Ltd through which development costs and proceeds would be shared 70-30.

DESCRIPTION

The showing is on the western edge of a 36 by 50 km basin of Aphebian Hurwitz Group metasediments. The Hurwitz Group sediments unconformably overlie Archean Henik Group greywacke and slate that enclose gold-bearing iron-formation. Numerous east- to east-southeast- and north-northwest-trending faults dissect the Aphebian basin.

The gold occurs in zones of open fractures and breccias in orthoquartzite. Pyrite, magnetite and chlorite are associated with the gold at depth, but nearer the surface these minerals are altered to hematite, limonite, goethite and saponite. Visible gold, as fine flakes and dendrites, is relatively common in the oxidized material.

CURRENT WORK AND RESULTS

Thirteen holes totalling 2,060.8 m were drilled on the Shear Lake Showing in 1983. The results of the first few holes were so encouraging that a decline was started in June to evaluate the drill-indicated zones by bulk-sampling. The 427 m decline reached the 61 m level in November. Six gold-bearing zones, 3 of which are new discoveries, were encountered in the decline. Samples (cut to 34.2 ppm) taken from the decline walls assayed:

Zone	Width (m)	Au content (ppm)
E-16	1.5	17.8
E-17	1.5	14.0
E-18	3.1	11.6
E-18.5	4.6	12.0
E-19	3.1	13.3
E-20	6.1	6.8

Drifting for 58 m east and west of the decline indicates that the E-19 zone contains an average 28.4 ppm Au over widths of 0.9 to 1.8 m (samples cut to 34.2 ppm). The showing is believed to contain 1 million tonnes of ore to the 183-m level (Cullaton Lake Gold Mines Ltd. Annual Report).

GRIFFIN LAKE PROJECT

Noranda Exploration Company Ltd.
2130 Notre Dame Ave.
Winnipeg, Man., R3H 0K1

Gold, Nickel
65 G/7
61°19'N,98°51'W

REFERENCES

Eade (1974); Laporte (1981).
DIAND assessment report: 081562.

PROPERTY

GRIF 1, ROY 1-31, STRIDER 1-74. 65 G/7

LOCATION

The claims are northwest of Griffin Lake (Fig. 5-6).

HISTORY

The BULK 1-4, CEDAR 1-7, FIVER 1-16, GOR 1-9, ROY 1-31 and STRIDER 1-74 claims were staked in 1977 to cover INPUT anomalies detected in 1976. Mapping and prospecting were used to explore the claims in 1977 (Laporte, 1981). All but the FIVER, ROY and STRIDER claims lapsed in 1979. The FIVER claims lapsed and the GRIF claim was staked in 1982.

DESCRIPTION

The property covers part of a 2- to 5-km wide, east-trending belt of volcanic and ultramafic flows north of Griffin Lake. These Archean Henik Group rocks are overlain north and west of Griffin Lake by Aphebian Hurwitz Group quartzitic sediments and are in contact to the north with Archean paragneiss and pelitic gneiss.

The 1977 work indicated that the spinifex-textured ultramafic flows on the STRIDER claims are enriched in Ni, Cu, Cr and Co. Gold occurs with arsenopyrite and pyrite in the metavolcanics.

CURRENT WORK AND RESULTS

Three newly established grids and one pre-existing grid were mapped and surveyed with magnetometer and VLF-EM. The new grids cover iron-formation interbedded with volcanic and ultramafic flows. Channel sampling of the iron-formation did not detect gold concentrations, but massive to disseminated sulphides in the ultramafic flows contained 2.1 to 0.73% Ni. One quartz vein in a carbonate and sulphide facies exhalite zone in the volcanics contained 37 ppm Au.

BANSHEE CLAIM

Esso Resources Canada Ltd.	Gold
237 - 4th Ave., SW	65 G/8
Calgary, Alta., T2P 0H6	61°27'N,98°24'W

REFERENCES

Eade (1974).

DIAND assessment reports: 017051, 081580.

PROPERTY

BANSHEE	65 G/8

LOCATION

The claim is 5 km north of Bernier Lake (Fig. 5-6).

HISTORY

Two gold-bearing zones were discovered and staked as the GREG 1-16 claims by prospectors working for Selco Northern Ltd. in October, 1964. Mapping, trenching and boulder sampling were done in 1965, but the property was allowed to lapse in 1967. O'Brien Energy and Resources Ltd. restaked the area as the MORT claim in 1978 but did not record any work. The BANSHEE claim was staked in 1981.

DESCRIPTION

Archean Henik Group paragneiss and pelitic gneiss derived from greywacke and enclosing layers of metamorphosed magnetic iron-formation trend east in the northern half of the claim. These rocks are overlain to the south by quartzite, slate and dolomite of the Aphebian Hurwitz Group.

The work done in 1965 outlined two distinct, narrow and parallel zones of gold concentration in iron-formation consisting of alternating bands of magnetite and biotite schist. Twelve of the 142 samples collected from the 23- and 32-m-long trenches contained 7 ppm Au or more.

CURRENT WORK AND RESULTS

The 1982 geological mapping, prospecting and magnetometer surveys outlined the two gold showings. The gold is in chloritic sulphide-bearing quartz-feldspar-biotite schist.

Eleven holes totalling 169.8 m were drilled on the Trench Showing and intersected up to 2.22 ppm Au over 3.75 m and 9.58 ppm over 0.33 m. Three holes totalling 32.31 m on the Midnight Showing intersected up to 3.98 ppm Au over 3.05 m.

DRAM CLAIMS

Esso Resources Canada Ltd.	Gold
237 - 4th Ave., SW	65 G/16
Calgary, Alta., T2P 0H6	61°55'N,98°23'W

REFERENCES

Eade (1974).

DIAND assessment report: 081575.

PROPERTY

DRAM 1-2	65 G/16

LOCATION

The claim extends west from the northwest shore of Carnecksluck Lake to the northern tip of Nowyak Lake.

HISTORY

The claims were staked in August, 1981 after the discovery of a boulder containing 139.3 ppm Au.

DESCRIPTION

An east-northeast-trending belt of Archean Henik Group volcanics is intruded, in the Carnecksluck Lake area, by grey to pink granodiorite. The contact between volcanics and granodiorite trends northeast across the claims. Greywacke of the Henik Group outcrops along the volcanic-intrusion contact on a peninsula at the northeast end of Nowyak Lake.

CURRENT WORK AND RESULTS

A grid covering the contact between volcanics and granodiorite was established in 1982 and surveyed with VLF-EM. Mapping, prospecting, trenching and the drilling of 5 holes totalling 69 m indicated that the gold is in pyrite- and chalcopyrite-filled fractures in granodiorite. The randomly oriented fractures are less than 1 cm wide. The best intersection was 8.62 ppm Au over 2 m.

KOGNAK RIVER PROJECT

Kognak Gold Explorations Ltd.	Gold
402, 27 Queen St., E	65 H/4,5
Toronto, Ont., M5C 2M6	61°15'N,97°45'W

REFERENCES

Eade (1974); Laporte (1974a, 1983a, 1984).

DIAND assessment report: 081504.

PROPERTY

The claims and prospecting permits held by the company are listed in Figure 5-6.

LOCATION

The properties cover an area extending north from Otter Lake, across the Kognak River to the north shore of Montgomery Lake (Fig. 5-6).

HISTORY

Five of the prospecting permits were acquired in 1981 and Prospecting Permit 900 was acquired in 1982. Prospecting Permits 806 and 807 cover the northern half of the area previously held as Prospecting Permit 46 by Selco Exploration Company Ltd. from 1964 to 1967 and as Prospecting Permit 150 by Atlantic Richfield Canada Ltd from 1969 to 1972. Prospecting Permits 808 to 810 and 900 cover ground staked for Iso Mines Ltd in 1969. Exploration in the mid 1960's included mapping, prospecting, trenching and diamond drilling of gold showings south of Otter Lake. In the late 1960's and early 1970's, the focus of exploration was uranium in the Aphebian sediments (Laporte, 1974a). The area held as Prospecting Permit 900 was held as Prospecting Permit 600 by PNC Exploration (Canada) Company Ltd from 1979 to 1982. Airborne geophysical surveys and geochemical lake sediment and water surveys were done on the permit in 1979 (Laporte, 1983a).

Geological mapping, prospecting, lithogeochemical sampling and reconnaissance VLF-EM and magnetometer surveys done on Prospecting Permits 806 to 810 in 1981 outlined 6 areas of interest (Laporte, 1984). The 14 claims were staked in August 1983 to cover parts of Prospecting Permits 808 to 810 which expired in 1984 along with Prospecting Permits 806 and 807.

DESCRIPTION

Three major rock assemblages outcrop within the area. The Archean Henik Group, which consists of volcanic rocks, greywacke, phyllite, argillite and thick sequences of hematite- and magnetite-rich iron-formation, outcrops east and west of Montgomery Lake, southeast of Ducker Lake and north of the Kognak River. Rocks of this group are overlain south of Montgomery Lake by conglomerate and quartzite of the Aphebian Montgomery Lake Group. The youngest rocks present are orthoquartzite, slate, shale, siltstone, dolomite, greywacke, impure arenites and gabbro sills of the Aphebian Hurwitz Group, which outcrop in a north-trending basin in the western permit areas. The Henik Group rocks are intruded by Archean granodiorite and metamorphosed to schist and amphibolite along the Kognak River.

CURRENT WORK AND RESULTS

A 5 line-km grid was established in the northwest corner of Prospecting Permit 900 in 1982 and explored with a magnetometer survey. This survey outlined a 300-m-wide anomaly caused by iron-formation, boulders and outcrops of which contained 0.2 to 4.8 ppm Au.

LONGSWAMP CLAIMS

Esso Resources Canada Ltd	Gold
237 - 4th Ave., SW	65 H/15
Calgary, Alta., T2P 0H6	61°47'N,96°36'W

REFERENCES

Bell (1970)

PROPERTY

LONGSWAMP 1-6	65 H/15

LOCATION

The claims are centered on a large unnamed lake 6 km southwest of the south end of Yandle Lake.

HISTORY

LONGSWAMP 1-6 were staked in September, 1981 and lapsed in 1983.

DESCRIPTION

Archean Kaminak Group felsite, tuff, agglomerate, quartz porphyry and minor greywacke underlie the claims. The volcanic rocks are intruded in the northern part of the property by grey hornblende diorite and biotite-hornblende tonalite.

CURRENT WORK AND RESULTS

Five holes totalling 35.42 m were drilled in two areas of LONGSWAMP 6 but the results were not reported.

BAKER LAKE-THELON RIVER AREA

The Baker Lake-Thelon River area is underlain by a complex of gneisses and gneissic to massive granitic intrusions enclosing Archean volcanics to the south and Aphebian metasediments, with minor volcanic flows, to the northwest. Late Aphebian to early Helikian, shallow-dipping conglomerates, and arkosic sandstone and mudstone intruded by syenitic bodies and overlain by intermediate to felsic volcanic flows and pyroclastics cover the basement complex south and southwest of Baker Lake. Flat-lying quartzose conglomerates and sandstones of Paleohelikian age overlie the basement complex in the Thelon River area.

Exploration in the area was for uranium in the basement complex, in Aphebian sediments of the Hurwitz and Amer Groups and in late Aphebian to early Helikian Dubawnt Group sediments and volcanics.

SHANE LAKE PROJECT

Noranda Exploration Co. Ltd.	Uranium
2130 Notre Dame Ave.	55 M/11,14,15; 65 P/10
Winnipeg, Man., R3H 0K1	

REFERENCES

Blake (1980); Laporte (1983c, 1984); LeCheminant and others (1976, 1977); Reinhardt and others (1980).

DIAND assessment reports: 081553, 081608, 081693, 081697, 081703.

PROPERTY

Figure 5-8 lists the claims held by Noranda Exploration Company Ltd. south of Baker Lake.

LOCATION

The main group of claims extends southwest from Christopher Island to east of Kazan Falls. The MW claims are northeast and the SC claims are west of Thirty Mile Lake (Fig. 5-8).

HISTORY

The VASO claims were prospected and staked in 1978 and the remaining claims were acquired in 1979. The claims cover ground previously explored as part of the TMT Project by Pan Ocean Oil Ltd. and its precursors between 1969 and 1976. The claims were explored in 1979 with airborne and ground geophysical surveys, geochemical surveys, prospecting and geological mapping (Laporte, 1983c). INPUT conductors were explored in 1980 with geophysical surveys and the drilling of 16 holes totalling 846.88 m. The SC and MW claims were mapped and prospected. An INPUT survey was flown on the MS claims in 1981 and the two conductors detected were surveyed with ground geophysical, geological and geochemical surveys (Laporte, 1984). Two A, 2 MW, 2 V and 4 VASO claims lapsed in 1981. Seven MS, 2 MW, 3 V and all the SC claims lapsed and the area of the VASO 5-10 claims was reduced in 1982. Claim MW 2 lapsed in 1983.

DESCRIPTION

The claims cover the unconformity along the eastern and southern edges of the Baker Lake Basin. Dubawnt Group South Channel Formation conglomerate and Kazan Formation arkose outcrop in the western and northern parts of the claim groups and overlie Archean and/or Aphebian layered gneiss, gneissic intrusions and metavolcanic and metasedimentary belts.

The 1979 geophysical surveys outlined 13 conductive zones on the MS, V and VASO claims. Drilling in 1980 indicated that the conductors on the V and VASO claims are caused by graphitic chloritic tuffs and metavolcanics of the basement complex. The conductors on the MS claims are chloritic schists and mylonite zones. No economically interesting concentrations of uranium were detected in the drill holes, but track etch and scintillometer anomalies were detected in 1981 coincident with and adjacent to conductors on the MS and V claims (Laporte, 1984).

CURRENT WORK AND RESULTS

Sixteen holes totalling 1,217 m were drilled on claims MS 8, 14 and 15 in 1982. The holes probed anomalies outlined in 1981 and encountered uranium, copper and silver concentrations in fractured South Channel Formation conglomerate, the regolith overlying the basement and graphitic metasediments of the basement complex. The graphitic metasediments contained up to 2% Cu over 3 m and 93.6 ppm Ag.

A grid established on claims MS 3 to 6 was explored with magnetometer, HEM, VLEM, VLF-EM and Track Etch surveys. The grid covered uranium, copper, silver and molybdenum concentrations in fracture and breccia zones in Dubawnt Group rocks near the unconformity.

On the V 1, 2 and 7 and VASO 5 and 6 claims, 3 grids were established in 1982 and subjected to geological, prospecting, magnetometer and HEM surveys. One grid was also explored with VLF-EM and radiometric surveys. One grid covers pyrite-graphite-bearing quartz sericite schist in amphibotite; the second covers diorite instrusions in metavolcanics and metasediments of the basement complex, and the third covers fracture zones in South Channel Formation conglomerate and the adjacent basement complex.

HLEM, VLF-EM and magnetometer surveys were done in 1983 on the grid covering the fracture zones. Mapping and sampling indicate that the fractures in the conglomerate are filled with quartz, hematite, chlorite, chalcopyrite, silver and pitchblende and contain up to 0.4% U_3O_8 and 0.44% Cu. Geological mapping and a 385-sample till survey of the area south of Baker Lake and east of Bissett Lake outlined uranium- and copper-bearing

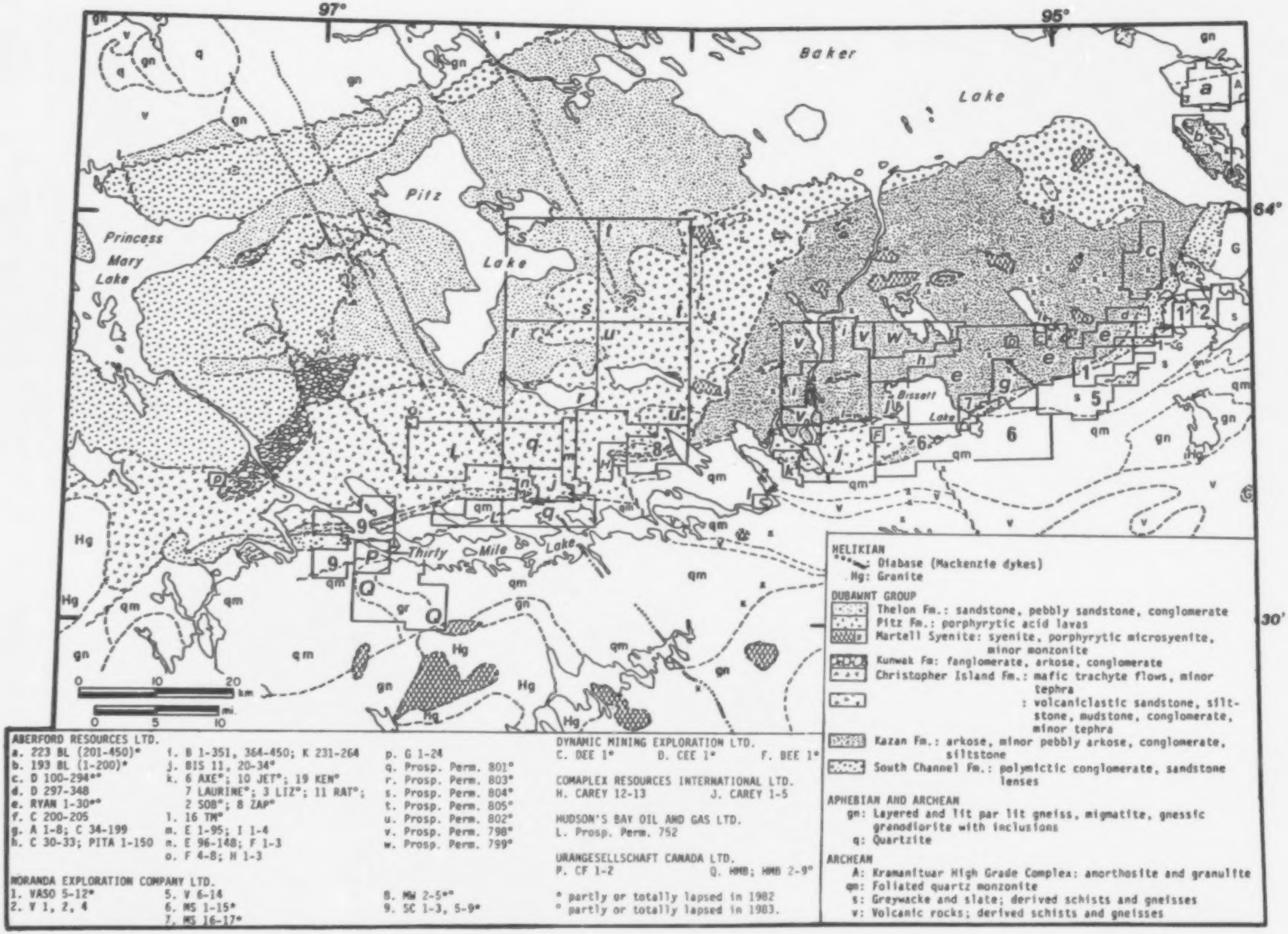

97°
95°
64°
30'
Baker Lake
Pitz Lake
Princess Mary Lake
Thirty Mile Lake
Bissett Lake
0 10 20 km
0 5 10 mi.
ABERFORD RESOURCES LTD.
a. 223 BL (201-450)*
b. 193 BL (1-200)*
c. D 100-294*°
d. D 297-348
e. RYAN 1-30*°
f. C 200-205
g. A 1-8; C 34-199
h. C 30-33; PITA 1-150
i. B 1-351, 364-450; K 231-264
j. BIS 11, 20-34°
k. 6 AXE°; 10 JET°; 19 KEN° 7 LAURINE°; 3 LIZ°; 11 RAT°; 2 SOB°; 8 ZAP°
l. 16 TM°
m. E 1-95; I 1-4
n. E 96-148; F 1-3
o. F 4-8; H 1-3
p. G 1-24
q. Prosp. Perm. 801°
r. Prosp. Perm. 803°
s. Prosp. Perm. 804°
t. Prosp. Perm. 805°
u. Prosp. Perm. 802°
v. Prosp. Perm. 798°
w. Prosp. Perm. 799°
NORANDA EXPLORATION COMPANY LTD.
1. VASO 5-12*
2. V 1, 2, 4
5. V 6-14
6. MS 1-15*
7. MS 16-17*
8. MW 2-5*°
9. SC 1-3, 5-9*
DYNAMIC MINING EXPLORATION LTD.
C. DEE 1*
D. CEE 1*
F. BEE 1*
COMAPLEX RESOURCES INTERNATIONAL LTD.
H. CAREY 12-13
J. CAREY 1-5
HUDSON'S BAY OIL AND GAS LTD.
L. Prosp. Perm. 752
URANGESELLSCHAFT CANADA LTD.
P. CF 1-2
Q. HMB; HMB 2-9°
* partly or totally lapsed in 1982
° partly or totally lapsed in 1983.
HELIKIAN
: Diabase (Mackenzie dykes)
Hg: Granite
DUBAWNT GROUP
Thelon Fm.: sandstone, pebbly sandstone, conglomerate
Pitz Fm.: porphyrytic acid lavas
Martell Syenite: syenite, porphyrytic microsyenite, minor monzonite
Kunwak Fm: fanglomerate, arkose, conglomerate
Christopher Island Fm.: mafic trachyte flows, minor tephra
: volcaniclastic sandstone, siltstone, mudstone, conglomerate, minor tephra
Kazan Fm.: arkose, minor pebbly arkose, conglomerate, siltstone
South Channel Fm.: polymictic conglomerate, sandstone lenses
APHEBIAN AND ARCHEAN
gn: Layered and lit par lit gneiss, migmatite, gnessic granodiorite with inclusions
q: Quartzite
ARCHEAN
A: Kramanituar High Grade Complex: anorthosite and granulite
qm: Foliated quartz monzonite
s: Greywacke and slate; derived schists and gneisses
v: Volcanic rocks; derived schists and gneisses

FIGURE 5-8: Geology and properties, Baker and Thirty Mile Lakes area (Geology from Blake, 1980; Donaldson, 1966; Eade, 1981b; Reinhardt and others, 1980 and Schau and Hubert, 1977).

impregnations and fracture fillings in Kazan Formation sandstone adjacent to lamprophyre dykes and one fracture-related showing in basement rocks which contained up to 6.0% U_3O_8 and 1778 ppm Ag.

A small fracture-related showing in a Christopher Island Formation volcanic vent on the MW 2 and 4 claims was gridded in 1983. VLF-EM and magnetometer surveys did not outline interesting anomalies.

In 1983, a grid was also established in an area of syenite subcrop on claim MS 8 and explored with mapping, magnetometer and VLF-EM surveys. Two areas of frost heaved syenite boulders were outlined and of the 40 samples collected, 22 contained more than 0.1% U_3O_8, 10 contained more than 0.2% U_3O_8 and one contained 0.9% U_3O_8. The uranium is in dark red syenite with chlorite and carbonate alteration and containing iron and copper sulphides.

TK PROJECT

Aberford Resources Ltd.
300 - 5th Ave., SW
Calgary, Alta., T2P 2M7

Uranium
55 M; 56 D; 65 P
63°52'N;95°30'W

REFERENCES

Blake (1980); Donaldson (1965); Laporte (1983c, 1984); LeCheminant and others (1976, 1977, 1979b); Miller (1980); Reinhardt and others (1980); Schau and Hubert (1977).

DIAND assessment reports: 081558, 081650.

PROPERTY

The numerous properties held by Aberford Resources Ltd. in the Baker Lake-Kazan Falls area are listed in Figure 5-8.

LOCATION

The claims and prospecting permits cover the area from north of Christopher Island to north of Forde Lake. The major claim groups are east of Kazan River (Fig. 5-8).

HISTORY

Aberford Resources Ltd. and its precursors have been exploring the area south and east of Baker Lake since 1968. Airborne and ground geophysical surveys, geochemical and geological surveys done from 1969 to 1976 and in 1979 led to the discovery of numerous uranium showings that were explored by diamond drilling. Cominco Ltd. optioned the properties in 1975 and operated the project in 1975 and 1976. The option was relinquished in 1977. The BIS 21-34 and RYAN 1-30 claims were staked in 1979 to cover the area east and west of Bissett Lake (Laporte, 1983c).

Airborne geophysical surveys, ground geophysical surveys and diamond drilling led to the discovery of the Bissett Creek South Showing in 1980. Prospecting Permits 798 to 805 were acquired in early 1981 and the properties were explored with lake water and sediment geochemical surveys, mapping, prospecting and detailed geochemical and geophysical surveys (Laporte, 1984). Prospecting Permit 800 was relinquished and 5 RYAN, 332 BL and 116 D claims lapsed in 1982. The other prospecting permits were relinquished in 1983 and 78 B, 9 BIS, 76 D and 19 RYAN claims were allowed to lapse.

DESCRIPTION

The properties cover the eastern end of the Baker Lake Basin, a 55-km-wide, northeast-trending belt of early Helikian Dubawnt Group rocks. These sediments and trachytic volcanics rest unconformably on the Archean/Aphebian basement complex along the southern and eastern edge of the basin and are in fault contact with the basement along the northern margin of the basin. A description of the various rock types forming the basement complex and filling the basin, and of the three types of uranium showings discovered before 1980, is given in Miller (1980) and summarized in Laporte (1983c).

The Bissett Creek South Showing, discovered in 1980, consists of uranium concentrations along the faulted contact between Kazan Formation sandstone and the basement complex. Uranium-bearing float and showings were discovered 2 km east of this showing in the East Bissett Lake Showing in 1981 (Laporte, 1984).

CURRENT WORK AND RESULTS

In 1982, the basement complex between Thirty Mile Lake and Andrews Lake was mapped and prospected. The complex is an assemblage of intercalated chloritic and muscovite-sericite-rich metasediments enclosing quartzite, thin layers of calc-silicate and conformable amphibolite. Graphitic layers are also present. Detailed geological work in the vicinity of known showings did not reveal any extensions.

In the East Bissett Lake Showing area, Turam EM, VLF-EM and gravity surveys were used to better define the geophysical conductors previously detected. Gravity surveys were also done in the Bissett Creek South Showing area and north of Thirty Mile Lake.

Analysis of 801 frost-boil samples collected in 1981 and 1982 from the Bissett Creek South grid delineated 13 anomalies, 11 of which correspond to EM conductors. Analysis of the 655 lake sediment samples collected in the permit areas in 1981 outlined 20 anomalous areas.

YATHKYED PROJECT

Noranda Exploration Company Ltd.	Uranium
2130 Notre Dame Ave.	65 J/5-7,10,11
Winnipeg, Man., R3H 0K1	

REFERENCES

Blake (1980); Eade (1980); Laporte (1983a, c; 1984).

PROPERTY

The claims held by Noranda Exploration Company Ltd. and AGIP Canada Ltd. are listed in Figure 5-9.

LOCATION

Most of the claims are part of a large group extending southwest from west of Yathkyed Lake to Angikuni Lake. Other claims are south, west and northwest of the main group (Fig. 5-9).

HISTORY

The 681 NIP claims were acquired in late 1975 after a radiometric, magnetic and VLF-EM survey was flown by Kenting Earth Sciences Ltd. Prospecting of the 1975 anomalies and ones detected during a second survey flown in 1976 resulted in the discovery of new uranium showings and the staking of 2,668 claims. The 865 BIR, DUG, GIO-MOR, HED, KOL, MOLSON, SUE, SUN and VANG claims were acquired in 1977.

INPUT surveys flown in 1977 outlined two zones of conductors on the RIB, FST and SUE claims. Nine holes were drilled in 1977 and 20 in 1978 to test the conductors in the RIB-FST area. A showing on the NIP claims was also drilled in 1978 (Laporte, 1983a). Six holes were drilled in 1979 on the RIB-FST grid, the BOG claims and the SUE claims (Laporte, 1983c). Geological mapping, IP, VLF-EM and magnetometer surveys, till geochemical surveys and diamond drilling were used to explore anomalies and showings on the BOG, GIO-MOR, G2 and RIB claims in 1980. As well, 9 holes were drilled to test 3 of the 7 conductors outlined on the NIP and FOG claims (Laporte, 1984).

Early in 1981, Pan Ocean Oil Ltd. (now Aberford Resources Ltd.) explored the Yathkyed Project properties in return for part ownership. Reconnaissance lake water and sediment surveys were completed in the summer of 1981 and the anomalies detected were prospected. Detailed surveys including VLF-EM, magnetometer, scintillometer, frost-boil geochemical sampling, mapping and prospecting were done in the vicinity of known showings and EM conductors. Six frost-boil anomalies were detected on the RIB-FST grid near the conductors drilled in 1980 and 3 uranium-silver-lead anomalies were outlined along a VLF conductor on the YAT claims. Detailed surveys on the NIP, REV and WET claims indicate that the original NIP showing is of little economic interest, but a second grid to the east covers interesting conductors and associated geochemical anomalies that could be an extension of the structure hosting 5.3 million kg U_3O_8 on the YU 1-36 claims (LGT'75 Project, Laporte, 1984).

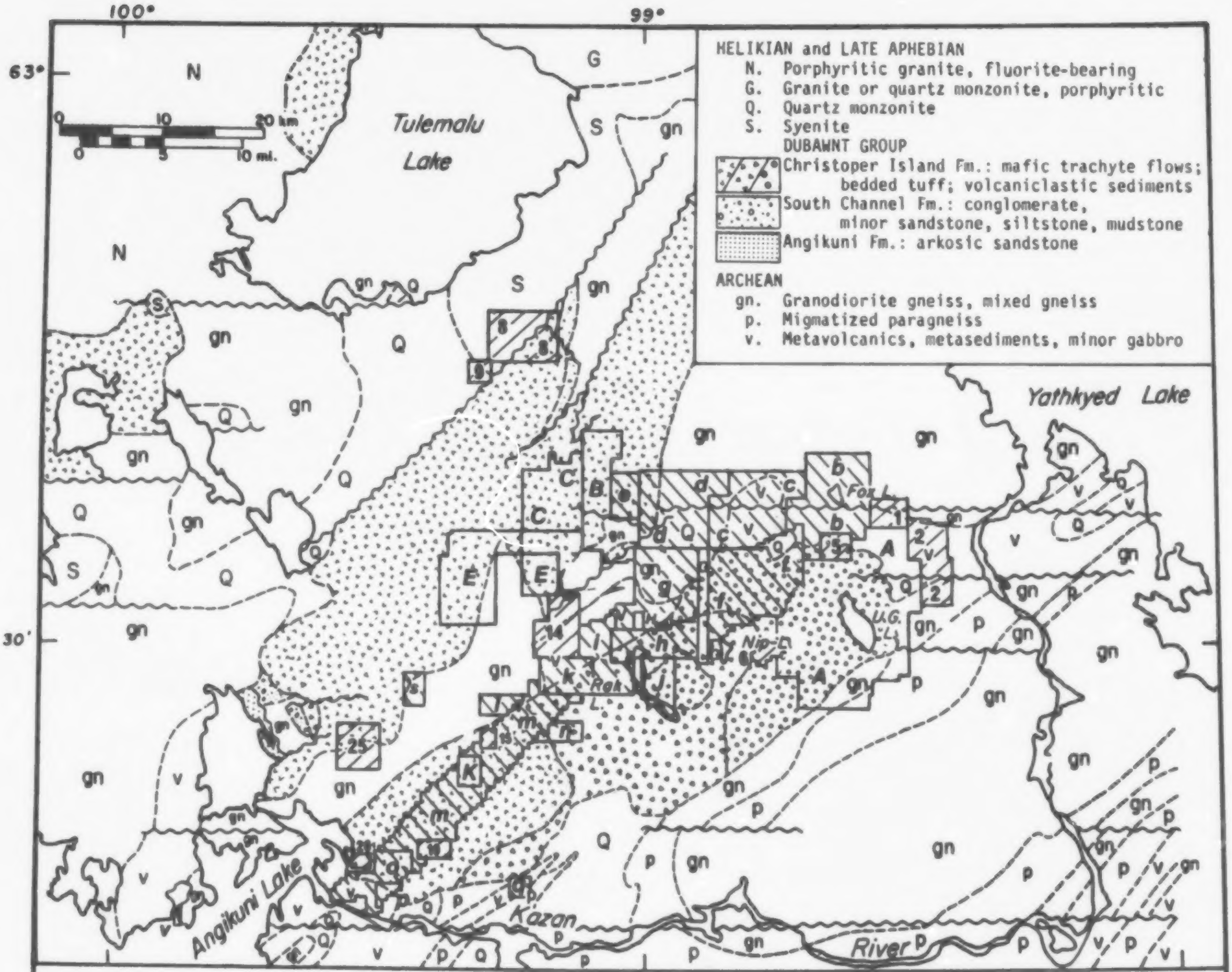
One ERM and 77 MOLSON claim lapsed in 1982 and 16 DUG, 1 FST, 16 HED, 13 PIN and 95 SUE claims in 1983.

DESCRIPTION

The main group of claims covers the northeastern, central and southern parts of a basin of Dubawnt Group sediments and volcanics and parts of the adjacent basement complex. Other claims cover parts of a second Dubawnt Group basin to the north, and outcrops of migmatized paragneiss and metavolcanics of the basement complex (Fig. 5-9). Uranium concentrations occur in quartz-feldspar mylonite, shear zones in Archean metavolcanics, syenite dykes and Dubawnt Group volcanics and sediments. The 3 conductors drilled on the NIP and FOG claims are caused by graphitic felsic tuffs and schists, graphitic amphibolite and sulphide concentrations in brecciated mafic volcanics. Uranium on the BOG claims is in a 50-to 150-m-wide zone of brecciated gneiss, granite and volcanic cemented by quartz and Dubawnt Group feldspar porphyry dykes (Laporte, 1984).

CURRENT WORK AND RESULTS

Ten holes were drilled by Aberford Resources Ltd. in 1982. Five holes totalling 406 m tested conductors on the NIP and FOG claims. Three holes totalling 321.6 m were drilled on YAT 13 and 2 holes totalling 219.2 m on RIB 10 and 15. The results of the drilling have not been reported.


100°
99°
63°
30'
0
10
20 km
0
5
10 mi.
Tulemalu Lake
Yathkyed Lake
Angikuni Lake
Kazan
River
Fox L.
U.G. L.
Nip. L.
Rok L.
HELIKIAN and LATE APHEBIAN
N. Porphyritic granite, fluorite-bearing
G. Granite or quartz monzonite, porphyritic
Q. Quartz monzonite
S. Syenite
DUBAWNT GROUP
Christoper Island Fm.: mafic trachyte flows; bedded tuff; volcaniclastic sediments
South Channel Fm.: conglomerate, minor sandstone, siltstone, mudstone
Angikuni Fm.: arkosic sandstone
ARCHEAN
gn. Granodiorite gneiss, mixed gneiss
p. Migmatized paragneiss
v. Metavolcanics, metasediments, minor gabbro
N
G
S
Q
gn
p
v
A
B
C
E
K
b
c
d
e
f
g
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m
1
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8
9
14
25

Noranda Exploration Company Ltd.
b. 97 FOG; REV 1-108; TEW 1-71
c. MUR 1-36; 82 SNO; WET 1-112; ZAK 1-24
d. BOG 1-280
e. WIT 1-60
f. 355 NIP
g. 46 ICE; OG 1-56; YAT 1-32, 34-110; 57 YED
h. 103 SOG; VER 1-35
i. 146 FST°
k. RIB 1-96
l. ERM 2*
m. BIR 1-28; HED 1-16°; MOLSON 1-333*
n. VIV 4
o. 95 SUE°
p. 13 PIN°
q. DUG 1-16°
s. GIO-MOR 1-16; G2
v. AN 1-13

Aberford Resources Ltd.
1. OV 1*
2. NU 1-4*
5. YU 1-36; FUG 1-7
6. YU 37-61
8. NU 15-17*°
9. YU 801-825
14. 108 YME, LIN 1-5
15. YU 219-234*°
19. YU 325-352*
25. YU 62-161°
26. YU 62-161°

* partly or totally lapsed in 1982
° partly or totally lapsed in 1983

Urangesellschaft Canada Ltd.
A. A 1-36; AA 1-2*; B 1-36; 48 BH; BJ 1-12; C 1-36; COW 1-20; CUR 1-18°; D 1-36; E 1-36; F 1-36; G 1-36; GEB 1-8; 18 GG°; H 1-36; I 2-37; J 1-36; K 1-36; L 1-39; M 1-36; MIT 1; N 1-36; O 1-8; P 1-37; Q 1-36; R 1-36; REY 1-10; WIE 1-19°
B. BIL 1-21; BUG 1-28; 36 CRO; CW 1-20; FAR 1-10; GEO 1-28; GER 1-19; GU 1-28; LAU 1-15; ROD 1-28; ROL 1-21; TB 1-12; UG 1-21; VAN 1-21
C. UHF 1-5*

Comaplex Resources International Ltd.
E. ANGI 9-16°; NORM 1

Essex Minerals Company
G. TUL 1-31, 44-61
H. TUL 266-273
J. LAK 1-14, 17-102
K. ORK 1-42*

FIGURE 5-9: Geology and claims, Yathkyed-Tulemalu Lakes area (Geology from Blake, 1980 and Eade, 1981b).

NOWLEYE LAKE PROJECT

Urangesellschaft Canada Ltd.	Uranium
3100, 2 Bloor St., E	65 K/5-7
Toronto, Ont., M4W 1A8	62°27'N,101°12'W

REFERENCES

Laporte (1983a, c, 1984); Tella and Eade (1981).

DIAND assessment reports: 081613, 081729.

PROPERTY

The claims are north of Nowleye and Kamilukuak Lakes (Fig. 5-10).

HISTORY

Prospecting Permits 488 and 489, the first properties, were acquired on January 1, 1978. The FNM 1-17 and NN 1-12 claims were added in August, 1978 and the FOO claims in September, 1978. The FOR, GO, GUS, IT and TO claims were staked in 1979 and the BB 1-28 claims were staked in 1980. The prospecting permits, the FOO, FOR, GO, GUS, IT and TOO claims and some of the FNM and NN claims lapsed in 1981. Claims BB 29-36 and HLV 1-3 were added to the properties in 1981 and LD 1-2 in 1982.

Airborne and ground geophysical surveys, reconnaissance and detailed geochemical surveys, mapping and prospecting from 1978 to 1981 outlined four main showings and numerous other areas of radioactivity (Laporte, 1983a, c, 1984).

DESCRIPTION

Trachytic volcanic flows and tephra of the Helikian Dubawnt Group Christopher Island Formation underlie most of the properties. These supracrustals are in fault contact to the west with Archean or Aphebian quartz monzonite augen gneiss, which also outcrops on the north shores of Kamilukuak and Nowleye Lakes.

Work in 1978 led to the discovery of two main showings northwest of Nowleye Lake. The South Showing consists of a 150-m by 75-m area of frost-heaved, cataclastic, granitic gneiss boulders. The boulders are highly chloritized and hematized and contain pyrite, coffinite, pitchblende and yellow uranium oxides. Twenty-one grab samples of frost-heaved boulders contained 0.03 to 4.0% U_3O_8. The North Showing, 800 m away, consists of a 60-m by 50-m area of frost-heaved boulders of pitchblende-bearing hematized Christopher Island Formation trachytes and altered Pitz Formation quartz-feldspar porphyry. The boulders sampled contained 0.191 to more than 5% U_3O_8 (Laporte, 1983c).

Uranium concentrations in Christopher Island Formation agglomerate and flows were outlined on claims FNM 11 and NN 7 in 1980. In 1981, areas of anomalous radioactivity in frost heave and outcrops of Christopher Island Formation were staked as the BB 29-36 and HLV claims (Laporte, 1984).

CURRENT WORK AND RESULTS

In 1982, the BB and HLV claims were mapped at 1:30,000 and prospected. A 2-km-long train of Christopher Island Formation trachyte boulders containing up to 0.453% U_3O_8 was discovered north of the BB claims and staked as the LD claims.

New grids and extensions to existing grids were constructed on the BB, FNM, HLV and NN claims and explored with geological mapping and prospecting, scintillometer, magnetometer, VLF-EM and geochemical surveys involving the collection of 3,750 A_0 and B_1 soil samples and 2,294 till samples. All of the showings and anomalies explored are fracture-controlled uranium concentrations in Christopher Island Formation trachyte. Samples containing up to 0.173% U_3O_8 were collected, but the extent of these showings is limited.

Ten holes totalling 1,583.8 m were drilled on the North and South Showings on the BB claims. Discontinuous uranium concentrations were detected in 5 holes with the best intersection grading 0.173% U_3O_8 over 3 m, 1 m of which contained 0.435%. The pitchblende is associated with pyrite, chlorite, hematite and carbonate in fractures in deformed augen gneiss and in brecciated Christopher Island Formation volcanics.

In 1983, a 34.3-line-km grid was established on the LD claims and explored with mapping, prospecting, soil sampling and scintillometer, magnetometer and VLF-EM surveys. Although interesting geophysical and geochemical anomalies were detected, the uranium content of the boulders sampled (up to 0.235% U_3O_8) was not considered sufficient to warrant drilling.

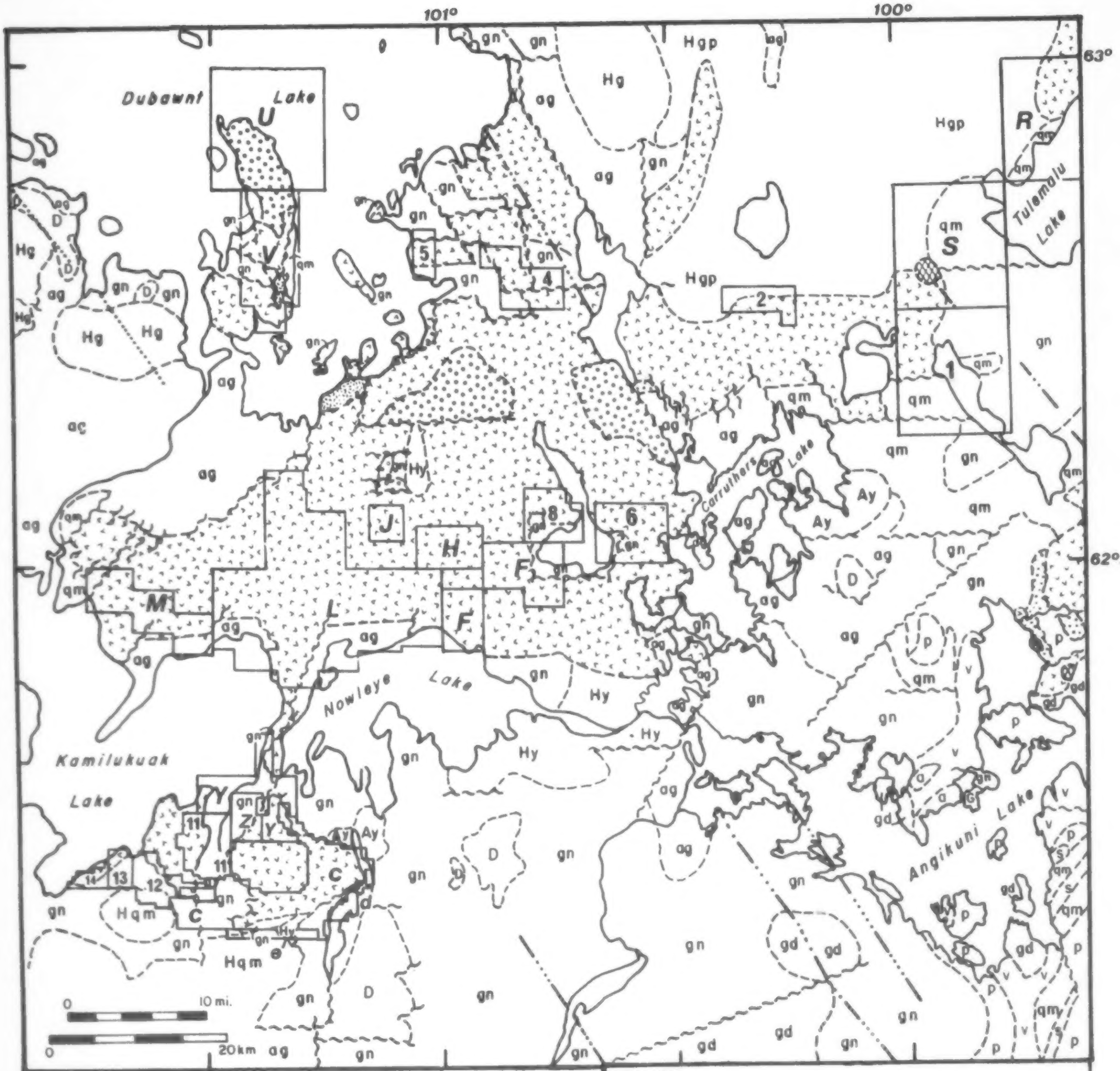
HAWK LAKE PROJECT

Noranda Exploration Co. Ltd.	Uranium
2130 Notre Dame Ave.	65 K/7,10,12,15
Winnipeg, Man., R3H OK1	62°33'N,100°45'W

REFERENCES

Eade (1981b); Laporte (1983a, c, 1984); Tella and Eade (1981).

DIAND assessment report: 081609.


101°
100°
63°
62°30'
Dubawnt Lake
Kamilukuak Lake
Nowleye Lake
Carruthers Lake
Tulemalu Lake
Angikuni Lake
U
V
R
S
1
2
4
5
6
8
J
H
F
M
L
C
Y
Z
11
12
13
14
Hgp
Hg
Hqm
Hy
Ay
D
qm
ag
gn
gd
p
v
0
10 mi.
0
20km

Noranda Exploration Company Ltd.
1. Prosp. Perm. 666*

Hawk Lake Project
2. SID 1-3*
4. L 5-6, 8-9°
5. ART 1-3
6. S 1-3, 6-8*
8. HAWK 1-4

Kam Lake Project
11. JEAN 1-195
12. 17 VAN, 101 WHY
13. 47 LOU
14. PHIL 1-42

Cominco Ltd.
c. KUZ 1-137*, P 1-161, 228-263, 311-472
d. SHUR 1-22, 24-45
e. HO 1-3

Urangesellschaft Canada Ltd.
F. FNM 1, 10-17*°
H. HLV 1-3
J. LD 1-2
L. BB 1-36*°
M. NN 3-4, 6-7, 9-10*

Union Oil Company of Canada Ltd.
R. Prosp. Perm. 653°
S. Prosp. Perm. 652°

Taiga Consultants Ltd.
U. Prosp. Perm. 688°
V. D 1-9*

E.&B. Exploration Ltd.
Y. YAT 5-7, 13-14*
Z. REWARD 1-80, 85-93, 98-104

* partly or totally lapsed in 1982
° partly or totally lapsed in 1983

HELIKIAN
- - : Diabase (Mackenzie dykes)
Hgp: Granite, coarse-grained, porphyritic, rapakivi texture
Hg: Granite, equigranular to porphyritic
Hqm: Quartz monzonite to granite
Hy: Syenite
DUBAWNT GROUP
⁘ Conglomerate, arkose, sandstone; may in part be equivalent to Thelon Fm.
▨ Pitz Formation: quartz-feldspar porphyries and associated volcanic rocks
▦ Alkalic igneous intrusions including Martell syenite
☐ Christopher Island Fm.: volcanic flows, pyroclastics and volcanogenic sediments
⁘ Angikuni Fm.: sandstone, mudstone; also includes conglomerate, arkose and wacke

APHEBIAN/ARCHEAN
D: Diorite, quartz diorite, minor gabbro
Ay: Syenite to quartz monzonite, foliated to massive
qm: Quartz monzonite, massive to slightly foliated
ag: Quartz monzonite augen gneiss

ARCHEAN
gd: Foliated granodiorite, granodiorite orthogneiss
gn: Layered gneiss, migmatite, gneissic granodiorite
p: Paragneiss, pelitic and melanocratic gneiss
v: Volcanic rocks

FIGURE 5-10: Geology and properties, Nowleye-Kamilukuak Lakes area (Geology from Eade, 1981b).

PROPERTY

The claims explored as part of the HAWK Lake project and listed in Figure 5-10 are held jointly by Noranda Exploration Company Ltd. and AGIP Canada Ltd.

LOCATION

The claims are northeast of Nowleye Lake and north of Kamilukuak Lake (Fig. 5-10).

HISTORY

Noranda Exploration Company Ltd. registered the HAWK 1-3 claims in July, 1978, and 80 other claims in 1979. The ART and SID claims were staked in 1980. All but 11 of the claims staked in 1979 lapsed in 1981. The S and SID claims lapsed in 1982 and the L claims in 1983. AGIP Canada Ltd. acquired 50% ownership of the claim and became the project operator in 1982.

Prospecting, mapping, geochemical and geophysical surveys done between 1978 and 1981 outlined a number of uranium-rich boulder trains and showings. Nineteen Winkie holes totalling 134.4 m and 16 BQ holes totalling 1,408.6 m were drilled on the HAWK claims from 1978 to 1980. Six Winkie holes totalling 48.5 m and 9 BQ holes totalling 437.6 m were drilled on the S claims in 1980. (Laporte 1983a, c, 1984).

DESCRIPTION

The claims cover the unconformity and fault contacts between the granitic basement complex and the Helikian Christopher Island Formation volcanics. A fault-bounded basement re-entrant underlies the southern part of Hawk Lake and consists of quartzo-feldspathic gneiss. Basement rocks on the northern claim groups include quartz monzonite augen gneiss and quartzo-feldspathic gneiss intruded to the north and east by Helikian coarse-grained rapakivi-textured granite.

The showing on the HAWK claims is an 80- by 150-m zone of brecciated Christopher Island Formation volcaniclastic sediments cemented with quartz and calcite. Uraninite and secondary uranium minerals occur to a depth of 50 m while fine-grained molybdenite occurs to a 70-m depth. The second showing drilled, on the S claims, consists of pitchblende in a carbonate-cemented breccia in Christopher Island Formation trachyte flows. Uranium has been found over an area 40 m wide and greater than 75 m long to a depth of at least 62 m.

Other interesting uranium concentrations were outlined on the ART and L claims. The L-1 Showing consists of pitchblende-filled fractures in biotite trachyte at the fault contact between basement gneiss and volcanics. The L-2 Showing is a train of uranium-bearing trachyte boulders near a sliver of basement gneiss. A large field of radioactive, fractured hematitic boulders containing 0.041 to 2.5% U_3O_8 extends more than 500 m on the ART claim.

CURRENT WORK AND RESULTS

Three of the showings explored in 1981 (Laporte, 1984) were drilled in 1982. Twenty holes totalling 1247.86 m tested the L-1 Showing and intersected phlogopite trachyte, sandstone, siltstone and boulder conglomerate overlying foliated granite. A zone approximately 60 m by 100 m was delineated which contains fracture-controlled uranium concentrations in trachytic flows.

The showing on the ART claims was tested with 8 holes totalling 579.25 m. The drilling intersected massive trachyte cut by a series of barren quartz veins.

Three holes totalling 244.82 m were drilled on the HAWK claims but failed to outline extensions to the previously defined showing.

THIRTY MILE LAKE PROJECT

Urangesellschaft Canada Ltd.	Uranium
3100, 2 Bloor St., E	65 0/9; P/10
Toronto, Ont., M4W 1A8	

REFERENCES

Laporte (1979, 1981, 1983a, c, 1984); LeCheminant and others (1979a, b, 1980, 1981).

DIAND assessment reports: 081579, 081704.

PROPERTY

The properties explored as part of the Thirty Mile Lake Project are listed in Figure 5-11.

LOCATION

The Thirty Mile Lake Project covers parts of the area south and west of Thirty Mile Lake (Fig. 5-11).

HISTORY

The original properties, Prospecting Permits 374 to 376, were acquired in April, 1976 (Laporte, 1979, 1981). The POT 1-12 and UTH 1-3 claims, covering parts of Prospecting Permit 374, and the JJ 1-4 claims were recorded in 1978 (Laporte, 1983a). Prospecting Permits 634 and 635 were acquired in 1979 along with 10 FC claims, covering parts of Prospecting Permit 375, and the CF, OTL and HMB 1

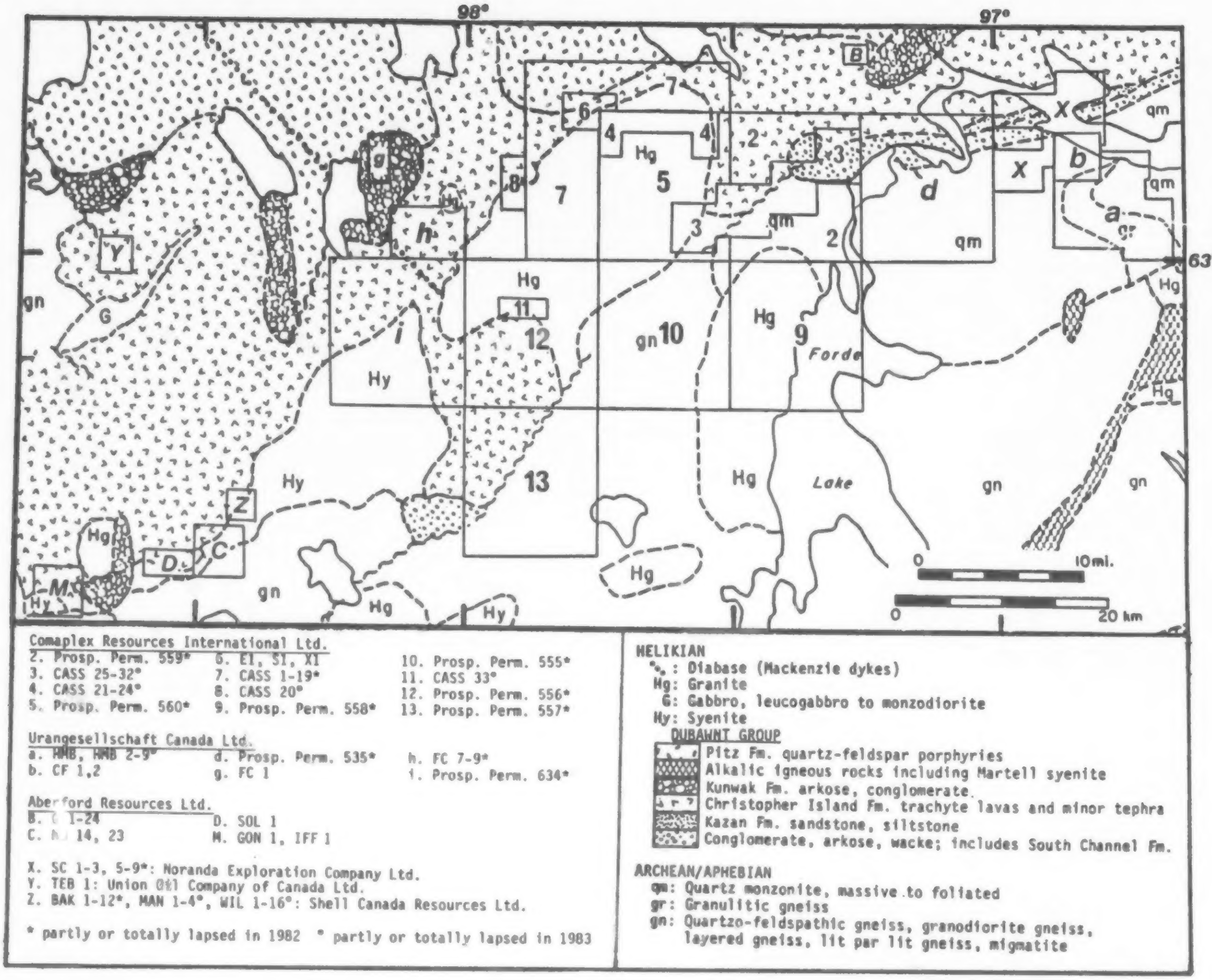

98°
97°
63°30'
B
X
X
b
a
gr
qm
qm
qm
d
1
2
3
4
4
5
6
7
7
8
9
10
11
12
13
g
h
i
Y
Z
C
D
M
G
Hg
Hy
gn
Forde
Lake
0
10 mi.
0
20 km
Comaplex Resources International Ltd.
2. Prosp. Perm. 559*
3. CASS 25-32°
4. CASS 21-24°
5. Prosp. Perm. 560*
6. EI, SI, XI
7. CASS 1-19*
8. CASS 20°
9. Prosp. Perm. 558*
10. Prosp. Perm. 555*
11. CASS 33°
12. Prosp. Perm. 556*
13. Prosp. Perm. 557*
Urangesellschaft Canada Ltd.
a. HMB, HMB 2-9°
b. CF 1,2
d. Prosp. Perm. 535*
g. FC 1
h. FC 7-9*
i. Prosp. Perm. 634*
Aberford Resources Ltd.
B. [illegible] 1-24
C. [illegible] 14, 23
D. SOL 1
M. GON 1, IFF 1
X. SC 1-3, 5-9*: Noranda Exploration Company Ltd.
Y. TEB 1: Union Oil Company of Canada Ltd.
Z. BAK 1-12*, MAN 1-4°, WIL 1-16°: Shell Canada Resources Ltd.
* partly or totally lapsed in 1982 ° partly or totally lapsed in 1983
HELIKIAN
: Diabase (Mackenzie dykes)
Hg: Granite
G: Gabbro, leucogabbro to monzodiorite
Hy: Syenite
DUBAWNT GROUP
Pitz Fm. quartz-feldspar porphyries
Alkalic igneous rocks including Martell syenite
Kunwak Fm. arkose, conglomerate.
Christopher Island Fm. trachyte lavas and minor tephra
Kazan Fm. sandstone, siltstone
Conglomerate, arkose, wacke; includes South Channel Fm.
ARCHEAN/APHEBIAN
qm: Quartz monzonite, massive to foliated
gr: Granulitic gneiss
gn: Quartzo-feldspathic gneiss, granodiorite gneiss, layered gneiss, lit par lit gneiss, migmatite

FIGURE 5-11: Geology and properties, Forde Lake area (Geology from Blake, 1980 and Eade, 1981b).

claims (Laporte, 1983c). Claims HMB 2-8 were added to the properties in 1980 and the JJ, POT and UTH claims were allowed to lapse. Claims FC 2-6 and 10 and OTL lapsed in 1981; FC 7 and 9 lapsed in 1982, and HMB 8 in 1983. Claim HMB 9 was staked in 1982.

From 1976 to 1979, airborne radiometric, VLF-EM and magnetometer surveys, reconnaissance geochemical surveys, mapping and prospecting were used to explore the area west of Thirty Mile Lake. A number of anomalies were outlined and explored with ground geophysical, geochemical and geological surveys. In 1980 and 1981, most of the work was done south of Thirty Mile Lake. Mapping, prospecting, detailed geochemical and geophysical surveys and trenching were used to explore a uranium occurrence on claim HMB (Laporte, 1984).

DESCRIPTION

The properties are on the southern and western edges of a basin of Dubawnt Group sediments and volcanics that extends south and west from Baker Lake. Trachytic lavas and tephra of the Christopher Island Formation are overlain, to the north and east of the study area, by dacite and rhyolite flows and welded tuffs of the Pitz Formation. Fanglomerate, siltstone, sandstone and conglomerate of the Kunwak Formation outcrop at the contact between the two volcanic units on the FC claims. Helikian syenite and granite plutons intrude the Christopher Island Formation volcanics to the south and east of the claims. The basement complex outcrops on the HMB and CF claims and consists of Archean and Aphebian foliated quartz monzonite, layered gneiss and granulitic gneiss. The showings worked on before 1980 are small pitchblende veinlets in the volcanics and 3- to 15-m-wide and 100-m-long zones of quartz-fluorite veinlets and calcite stringers in hematized black andesite overlying sandstone and siltstone.

CURRENT WORK AND RESULTS

Three grids were established on the CF 2 (LZ grid), FC 1 (JB-79 grid) and HMB 5 and 9 (SAL grid) claims in 1982 and the HMB grid on claim HMB and HMB 7 was extended. The remaining claims were mapped and prospected at 1:31,680. The HMB extension and LZ grids were explored with mapping at 1:2,500, overburden sampling (1,157 sites on the LZ grid and 1,509 sites on the HMB grid), magnetometer, VLF-EM, MaxMin EM and gravity surveys. The SAL grid was mapped and surveyed with scintillometer, magnetometer and VLF-EM. The JB-79 grid was explored with magnetometer and VLF-EM surveys and a 142-sample overburden geochemical survey. Trenching was done on showings on the HMB, SAL and LZ grids.

The SAL grid covers a zone of uranium-bearing calcite-filled fractures up to 3 m wide and 100 m long in amphibolite and gneiss. On the LZ and HMB grids, uranium is associated with alkali metasomatism along mylonitic shears in garnet-biotite gneiss. Grab samples of episyenite contain up to 0.074 and 0.695% U_3O_8.

In 1983, 10 holes totalling 1,280.5 m were drilled on the HMB grid. Eight holes tested coincident gravity low, magnetic low and geochemical anomalies and defined a pipe-like body 150-m-wide and 250-m-long in a 400-m-wide body of episyenite derived from garnet biotite gneiss. Core samples contained up to 0.173% U_3O_8 over 1.2 m. The 2 other holes tested uranium concentrations in brecciated gneiss and intersected a narrow fracture zone containing up to 0.109% U_3O_8 over 0.9 m.

Mapping, prospecting and soil sampling on the grid on claim FC 8 outlined fracture-controlled uranium concentrations in Christopher Island Formation trachyte. The pitchblende is associated with chalcopyrite, covellite, galena and pyrite.

LONGSPUR PROJECT

Comaplex Resources Internat'l Ltd.	Uranium
901, 1015 4th St., SW	65 P/5,11,12
Calgary, Alta., T2R 1J4	63°33'N,97°40'W

REFERENCES

Laporte (1983c, 1984); LeCheminant and others (1977).

DIAND assessment report: 081540.

PROPERTY

The properties are listed in Figure 5-11.

LOCATION

The claims are northwest of Forde Lake (Fig. 5-11).

HISTORY

Prospecting Permits 555 to 560 were acquired by Comaplex Resources International Ltd. in early 1979 and the E, S and X claims were staked later that summer. The CASS 1-19 claims were added to the property in 1980 and the CASS 20-33 in 1981. The prospecting permits expired in early 1982 and 30 CASS claims lapsed in 1982 and 1983.

Geological mapping, prospecting, lake and soil geochemical surveys, airborne and ground geophysical surveys, trenching and diamond drilling were done on the properties from 1979 to 1981 (Laporte 1983c, 1984).

DESCRIPTION

The properties cover the contact between Aphebian or Archean quartzo-feldspathic gneiss, the overlying Helikian trachytes of the Christopher Island Formation and a large composite acid intrusion of Helikian age. To the north, the trachytes are overlain by dacite and rhyolite of the Pitz Formation.

Three showings were explored in 1980 and 1981. On the E, S and X claims, uranium occurs with quartz, grossularite, calcite, fluorite, epidote and specularite in fractures cutting the Christopher Island Formation volcanics and, to a lesser extent, the Helikian granite intrusion. Grab samples of the vein material from this BB Occurrence assayed up to 27.2% U_3O_8, but only 2 of the 9 holes drilled in 1980 intersected pitchblende veins. The Grizzly Showing on claim CASS 29 is a 10-m-wide and 70-m-long zone in Archean basement gneisses that encloses 3 pitchblende veins. The Who Showing on claim CASS 26 consists of one outcrop and several boulders of hematized and chloritized gneiss containing up to 0.177% U_3O_8.

CURRENT WORK AND RESULTS

In April, 1982, the grid on the BB Occurrence was extended over the ice covering nearby lakes and these extensions were explored with magnetometer, gradiometer and VLF-EM surveys.

LIL CLAIMS

Noranda Exploration Co. Ltd.	Uranium
2130 Notre Dame Ave.	66 A/3,4
Winnipeg, Man., R3H OK1	64°06'N,97°28'W

REFERENCES

Donaldson (1966); Laporte (1983c).

DIAND assessment report: 081606.

PROPERTY

LIL 2,3	66 A/3,4

LOCATION

The claims are northeast of Princess Mary Lake (Fig. 5-12).

HISTORY

Claims JIL 1-25 and LIL 1-22 were staked in 1978 to cover radioactive showings and boulders discovered by prospecting (Laporte, 1983c). All of these claims except LIL 2 and 3 lapsed in 1980 and 1981. The area of the LIL 2 and 3 claims was reduced in 1982 and the claims lapsed in 1983.

DESCRIPTION

The two claims cover outcrops of Archean and/or Aphebian volcanic rocks.

CURRENT WORK AND RESULTS

A 10.7 line-km grid was mapped, prospected and surveyed with HLEM and magnetometer. No radiometric anomalies or EM conductors were detected.

LONE GULL DEPOSIT

Urangesellschaft Canada Ltd.	Uranium
3100, 2 Bloor St., E	66 A/5
Toronto, Ont., M4W 1A8	64°27'N,96°37'W

REFERENCES

Donaldson (1966); Fuchs and others (1982); Laporte (1984).

DIAND assessment report: 081658.

PROPERTY

L 1-620 and SSL 1-128	66 A/5

LOCATION

The claims are north of Judge Sissons Lake (Fig. 5-12).

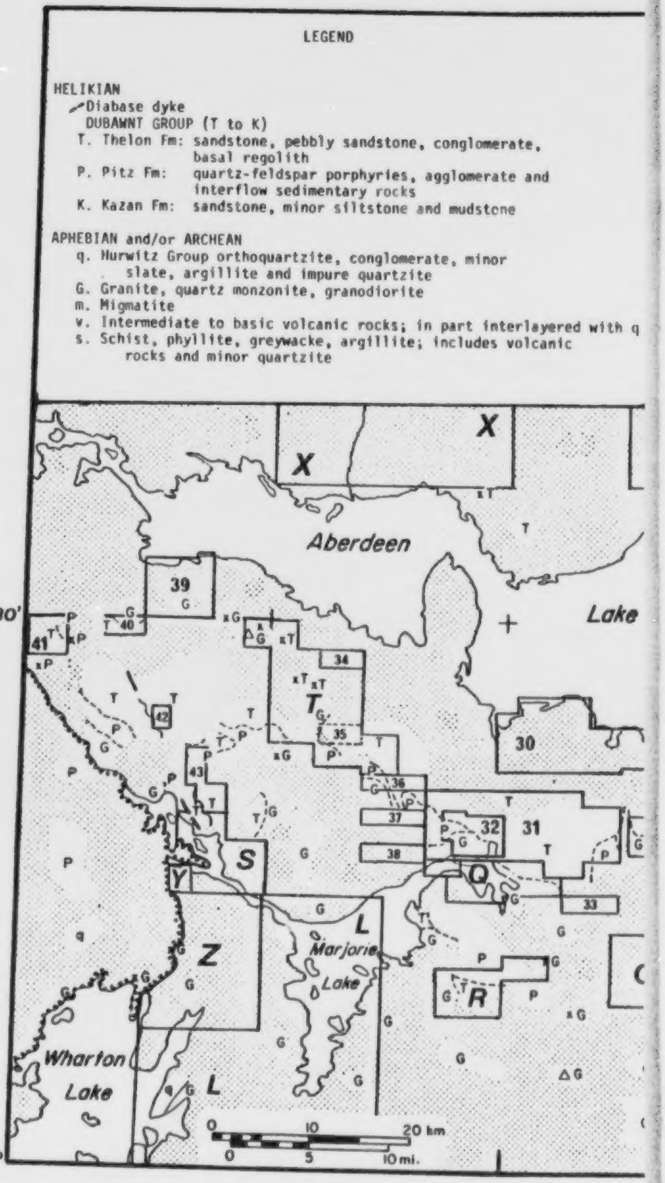
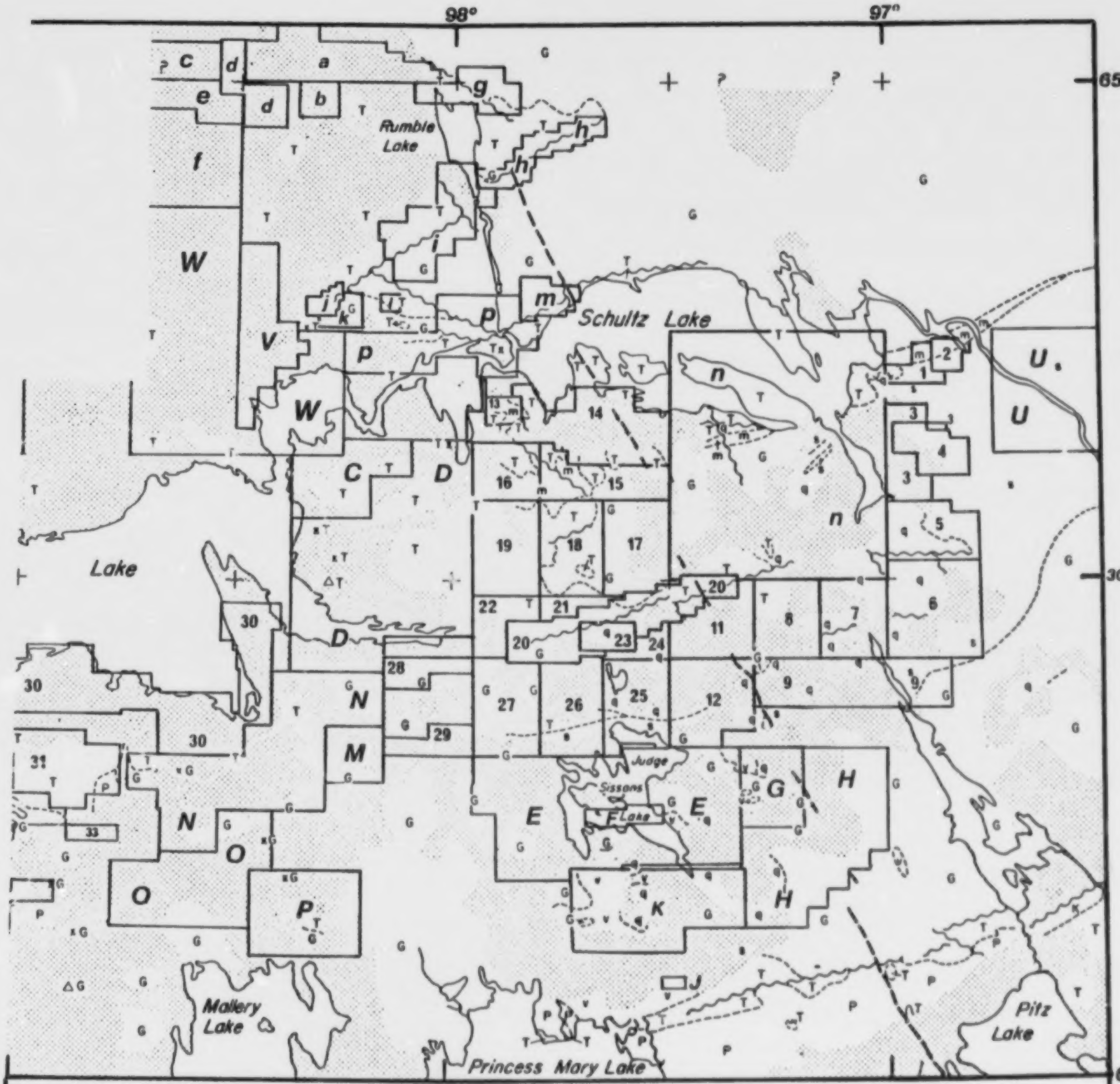

LEGEND
HELIKIAN
Diabase dyke
DUBAWNT GROUP (T to K)
T. Thelon Fm: sandstone, pebbly sandstone, conglomerate, basal regolith
P. Pitz Fm: quartz-feldspar porphyries, agglomerate and interflow sedimentary rocks
K. Kazan Fm: sandstone, minor siltstone and mudstone
APHEBIAN and/or ARCHEAN
q. Hurwitz Group orthoquartzite, conglomerate, minor slate, argillite and impure quartzite
G. Granite, quartz monzonite, granodiorite
m. Migmatite
v. Intermediate to basic volcanic rocks; in part interlayered with q
s. Schist, phyllite, greywacke, argillite; includes volcanic rocks and minor quartzite
X
X
Aberdeen
Lake
30'
64°
39
40
41
42
43
34
35
36
37
38
30
31
32
33
S
Y
Z
L
O
R
Marjorie Lake
Wharton Lake
0 10 20 km
0 5 10 mi.

FIGURE 5-12: Geology and properties, Schultz-Aberdeen Lakes area (Geology from Donaldson, 1966 and 1969).

HISTORY

The Lone Gull Deposit was discovered in 1974 during an airborne total-count radiometric survey conducted by Metallgesellschaft Canada Ltd. on their Prospecting Permits 317 to 327. Two isolated anomalies were discovered 750 m apart. The western anomaly corresponded to frost boils containing chips



URANGESELLSCHAFT CANADA LTD.
Project K-1, Baker Lake
1: OFF 10-11
2: THE 1-82
3: OFF 2-7
4: PIZ 1-236
5: COO 1-8
6: LA 1-12
7: DOVA 1-8
8: SHAY 1-8
9: LAST 1-8*, TREE 1-4°
11: OTHA 1-8
12: BAR 1-10
13: 78 SCH
14: IT 1-591, KF 8-9
15: AJOL 1-8
16: WUNZ 1-6
17: MAN 1-8
18: WAG 1-8
19: LYS 1-8
21: PED 1-4
22: CAM 1-6
24: BYA 3-6
25: UND 1-8
26: BONG 1-8
27: BILA 1-8
28: BS 2, 12, 13°
29: BS 5, 6, 9*
Lone Gull Deposit
20: L 1-620
23: SSL 1-128
Marjorie-Aberdeen Project
30: KC 1-22, 29-33*
31: 14 BB*°
32: AB 1-100, 152-199*°
33: MAJ 25
34: BA 6*
35: BA 15*
36: MAJ 41
37: MAJ 39
38: MAJ 36
39: KA 8-12*
40: KA 23*
41: KA 21, 24°
42: KB 1*
43: KB 6,9*

WESTMIN RESOURCES LTD.
a: ITZA 1-11
b: RN 1-2
c: WGE 1-4
d: CAN 1-178
e: EXT 1-10°
f: Prosp. Perm. 541

ESSEX MINERALS COMPANY
g: ALA 1-5
h: 200 CAN*
i: ALL 1-3, 5-11*°
j: RB 1-50
k: ALE 2-5
l: ALE 1
m: KEN 1-115°

n: F 1-77 - BP MINERALS LTD.

p: ELD 1-13* - MOBIL ENERGY MINERALS LTD.

COMINCO LTD.
C: WAD 1-8
D: DEEN 1-40°
E: JUD 1-38*°

COMAPLEX RESOURCES INTERNATIONAL LTD.
F: MYR 1-2°
G: NA 1-6*°
H: XYL 1-22*

J: LIL 2, 3° - NORANDA EXPLORATION COMPANY LTD.

MARLINE MINERAL EXPLORATIONS LTD.
K: V 35-43, VW 8-14
L. Prosp. Perm. 693-695*

ANACONDA CANADA EXPLORATION LTD.
M: XW 1-4
N: VW 4-7, W 1-23, CH 1-2
O: XW 5-23°
P: V 26-34, VW 1-3
Q. CONDA 7-11°
R: CONDA 12-15°
S: CONDA 1-5°

T: MARJ 1-11 - PNC EXPLORATION (CANADA) COMPANY LTD.

HUDSON'S BAY OIL AND GAS COMPANY LTD.
U: Prosp. Perm. 755°
V: AYA 1-21°
W: Prosp. Perm. 717-718, 721*°
X: Prosp. Perm. 719-720°
Y: MARJ 1*
Z: Prosp. Perm. 716*

* partly or totally lapsed in 1982
° partly or totally lapsed in 1983

of metasediments coated with yellow uranium secondary minerals. The eastern anomaly corresponded to grass-covered hummocky terrain near an outcrop of orthoquartzite.

In subsequent years, the area of the two anomalies was gridded and explored with a number of geochemical and geophysical surveys (Fuchs and others, 1982). The SSL and L claims were staked in 1976 and Prospecting Permit 318 lapsed in 1977. Drilling from 1977 to 1980 has identified three main uranium concentrations in arkosic sediments: the Main, Central and Eastern or '46 E' Zone. At the end of 1980, drilling totalled 12,013 m in 77 holes on the Main Zone, 4127 m in 36 holes on the Central Zone and 4314 m in 40 holes on the Eastern Zone. Eleven holes totalling 1178.4 m were drilled on other anomalies and showings within the claims in 1979 and 1980. The Lone Gull grid was extended in 1981 and explored with geophysical, geochemical and geological surveys including the relogging of the core from 85 of the first 106 holes drilled (Laporte, 1984).

DESCRIPTION

The Lone Gull Deposit is in a sequence of Aphebian arkosic quartzites and metapelites. The sequence includes garnetiferous impure quartzites, mafic chloritic metasediments of possibly tuffaceous origin and well-laminated siliceous beds. It is overlain by white orthoquartzite and underlain by greywacke. Granite, quartz-feldspar porphyry, lamprophyre, syenite and a diabase dyke intrude the metasediments on the Lone Gull grid.

Most of the uranium concentrations are in fracture zones and all have a well-defined alteration envelope. In the less altered rocks, chlorite, hematite and limonite occur along fractures. The more altered rocks are characterized by pervasive clay alteration (illite) with lesser chlorite, sericite, talc, hematite and limonite. The presence or absence of specific phyllosilicates is partly dependent on lithology; sericite is more common in the orthoquartzite and the underlying impure quartzite while the feldspathic quartzites are illitized. The chlorite may be an alteration of mafic-rich layers and talc is probably restricted to magnesium-rich sediments. The distribution of hematite and limonite is independent of other secondary minerals and probably reflects local reduction potential and permeability conditions. Pitchblende is commonly associated with limonite and rarely with hematite. In the dirty quartzites, pitchblende is in small blebs along fractures and in disseminated aggregates; in granite, uranium minerals occur in discrete veins and blebs along fractures. Reserves are 16,100 tonnes of U_3O_8.

CURRENT WORK AND RESULTS

Thirty-five holes totalling 3883 m were drilled on the Lone Gull grid in 1982. Sixteen holes totalling 1955 m were drilled between lines 30+00 E and 40+00 E to test a radon anomaly and encountered discontinuous uranium concentrations extending east to line 36+00 E. The Centre Zone between 25+00 E and 29+00 E was explored with 11 holes totalling 1196 m. The last 8 holes, totalling 732 m, probed anomalies west of the Main Zone and encountered essentially barren alteration zones.

Concurrent with the drilling, the Lone Gull and Granite grids were extended and the extensions were explored with magnetometer, soil, geochemical and radiometric surveys (Fig. 5-13). Gravity surveys on the eastern and western parts of the Lone Gull grid outlined anomalies over which Track Etch cups were planted. INPUT, MaxMin and EM-16R resistivity test surveys were done on the showings. The INPUT survey did not register any anomalies, the MaxMin survey outlined a weak anomaly at high frequency and the resistivity survey detected the alteration envelope even under 50 m of orthoquartzite.

In 1983, 20 holes totalling 2932 m tested 7 gravity anomalies in areas of favourable geology on the Lone Gull grid. Intense clay alteration was encountered in all but one of the holes but the best uranium concentration detected was 110 ppm over 7.7 m. Outside of the Lone Gull grid, exploration involved mapping and prospecting of the L and SSL claims and A_0 soil sampling of areas to the east and west of the grid. Trenching in the area of a radioactive frost boil on the Granite grid indicates that uranium is in a fracture associated with a quartz-feldspar porphyry dyke. Anomalies prospected on the Lucky 13 grid were mainly associated with phosphatic concentrations.

PROJECT K-1, BAKER LAKE

Urangesellschaft Canada Ltd.
3100, 2 Bloor St., E
Toronto, Ont., M4W 1A8

Uranium
66 A/5-7,10,12;B/8
64°30'N,97°30'W

REFERENCES

Donaldson (1966, 1969); Laporte (1983c, 1984); LeCheminant and others (1983).

DIAND assessment reports: 081546, 081566, 081658, 081673, 081687, 081718, 081772, 081773.

PROPERTY

The claims held by Urangesellschaft Canada Ltd. and forming part of this project are listed in Fig. 5-12.

LOCATION

Urangesellschaft's Project K-1 area extends north and northeast from Judge Sissons Lake to Schultz Lake and the Thelon River.

HISTORY

Urangesellschaft Canada Ltd. has been exploring the Judge Sissons Lake area since 1974 when an affiliated company, Metallgesellschaft Canada Ltd., acquired Prospecting Permits 317 to 327. Urangesellschaft Canada Ltd. acquired Prospecting Permits 352 and 353 in 1975. The SCH 1-136 and SSL 1-128 claims were acquired in 1976 and the IT 1-591, L 1-620, PIZ 1-236 and THE 1-82 claims in 1977. Most of the other claims were acquired in 1978 and the KF 1-9 and LAST 1-8 were staked in 1979. Eighty-one BS, DF, MOR, OFF and SCH claims lapsed in 1980 and 1981. In 1982, 1 BS and 2 LAST claims lapsed. Three BS and 1 TREE claim lapsed in 1983.

Reconnaissance geochemical surveys, airborne VLF-EM, radiometric and magnetometer surveys, geological mapping and prospecting of the claims in 1978 and 1979 outlined numerous anomalies. Fifty grids were established in 1979, 1980 and 1981 and explored with geological, geochemical and geophysical surveys (Laporte, 1983c, 1984). In 1980, 27 holes totalling 2127 m intersected minor uranium concentrations on three of the grids and barren granite and syenite on a fourth grid (Laporte, 1984).

DESCRIPTION

The Project involves a study of the western end of a metasedimentary belt trending northeast from Judge Sissons Lake to north of Whitehills Lake. The belt is bounded to the north and south by granitic gneisses, and the sediments are overlain to the northwest by sandstone, pebbly sandstone and conglomerate of the Thelon Formation. A regolith is present locally at the base of the Thelon Formation.

CURRENT WORK AND RESULTS

In 1982, the prospecting and mapping of 7 areas of radiometric anomalies on the northwestern claims indicated that most of the anomalies are caused by uranium-bearing phosphatic concentrations in Thelon Formation sandstone and brecciated Aphebian metasediments or concentrations of granite and gneiss boulders. Detailed geological, geophysical and geochemical surveys were done on 9 previously established grids or their extensions and 1 new grid (Fig. 5-13). Five holes totalling 587.7 m on the Queen Bess grid tested coincident geochemical and geophysical anomalies which were attributed to phosphate-enriched boulders of Thelon Formation sandstone in the drift. Two holes totalling 168.9 m tested a quartzite breccia on the Pyro grid and encountered phosphate-related uranium concentrations of up to 80.7 ppm.

On the southern and eastern claims, mapping and prospecting explored radiometric and geochemical anomalies on the BILA, TREE, SHAY, BAR, COO, OFF, THE, PIZ and BS claims. Detailed surveys were done on 8 old grids and 1 new one (Fig. 5-13). Grab samples from trenches on the LA 4 grid contained up to 2.07% U_3O_8.

In 1983, the northwestern block of claims were remapped and prospected at 1:25,000 and 2 new grids were established (Fig. 5-13). A number of the previously gridded anomalies were attributed to phosphatic concentrations.

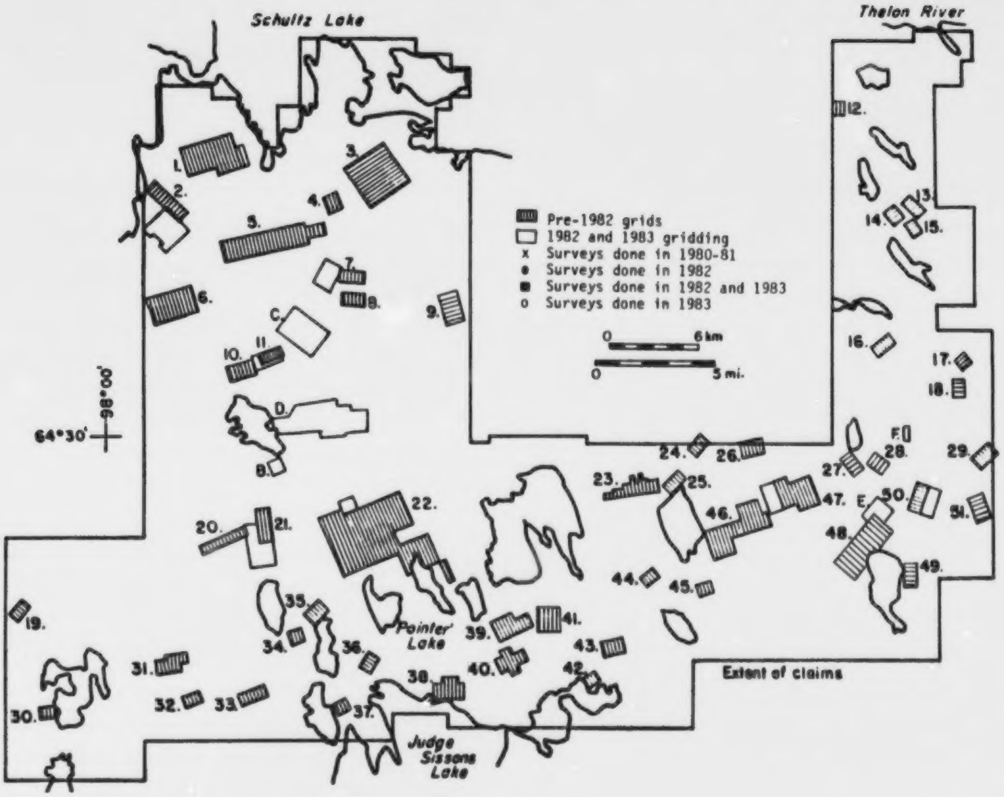
In the southern and eastern claim blocks, mapping and prospecting of the northern claims failed to detect any interesting uranium concentrations. One new and 5 old grids were explored (Fig. 5-13). Nine holes totalling 1,278 m were drilled on the LA 4 grid and outlined two types of uneconomic uranium concentrations. Pitchblende, clay alteration and pervasive hematization occur at the contact of the orthoquartzite with the underlying impure quartzite and in a breccia zone in the orthoquartzite.

MARJ CLAIMS

PNC Exploration (Canada) Co. Ltd.	Uranium
2401, 650 West Georgia St.	66 B/3,5,6
Vancouver, B.C., V6B 4N8	64°25'N,99°23'W

REFERENCES

Donaldson (1969); Laporte (1978, 1979, 1983a, c, 1984); LeCheminant and others (1983, 1984).


Schultz Lake
Thelon River
Pre-1982 grids
1982 and 1983 gridding
x Surveys done in 1980-81
• Surveys done in 1982
■ Surveys done in 1982 and 1983
o Surveys done in 1983
0 6 km
0 5 mi.
64°30'
98°00'
1.
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46.
47.
48.
49.
50.
51.
B
C.
D.
E
F
Pointer Lake
Judge Sissons Lake
Extent of claims

LOCATION NUMBER	NAME OF GRID	GRIDDING	PROSPECTING	MAPPING	Ao SOIL	B_1 TILL	WACKER DRILL	WATER	SCINTILLOMETER	MAGNETOMETER	MAXMIN EM	VLF-EM (SEATTLE)	VLF-EM (CUTLER)	RESISTIVITY	I.P.	GRAVITY	TRACK ETCH	ALPHA NUCLEAR
1	SCHULTZ	x	x	x										x				
2	IT WEST	x•	x	x•	x				•	•								
3	IT DIABASE	x	x•	x	x				x•	x		•	x					
4	IT 34	x	x	x	x								x					
5	PYRO LAKE	x	x	x•	x		x		•	x	•	x	x	x		x•	•	
6	78-S-42	x	x	x•	x•				•	x	•	x	•				•	
7	78-S-43	x•		x•	x•					x•	•	x•	x•	x		x•		
8	78-S-44	x	x•	x	x					x		x	x	x		x		
9	T LAKE	x	x•	x	x					x		x						
10	78-S-41 (QUEEN BESS)	x	x	x•	x•	x	x		x•	x		x	x	x		x•	x•	x
11	WAG	x	x	x•	x•	x			•	x•	•	x•	•				•	
12	OFF 10	x		x	x					x								
13	790 (BOULDER ALLEY)	x	x	x	x					x		x	x					
14	SWEET KNEES	x	x	x	x													
15	761 (PHILOSOPHY)	x	x	x	x					x								
16	79-S-24 (COO 5)	x		x	x				x	x	x	x	x			x	x	
17	COO 7 NORTH (KUWAIT)	x		x	x					x		x						
18	COO 7 SOUTH (SUICIDE)	x		x	x					x		x						
19	79-S-2 (COMMANDO)	x	x							x		x	x					
20	LUCKY 13			x						x		x					x	
21	GRANITE	x■	x	x	x■	x		x	■	x•		xo	xo	■		o	x■	
22	LONE GULL	x•		x	x■		x		x■	x•		x•	x	x■		x■	x■	
23	THELON		x	x														
24	AREA 27	x	x	x	x	x				x		x	x					
25	AREA 25	x	x	x	x■				•	x	x	x	x			x		
26	BOUNDARY						x										x	
27	RD 9	x		x	x					x		x	x					
28	RD 8	x		x	x	x						x	x					
29	562-563	x	x	x	x													
30	79-S-4 (ORANGETANG)	x	x						x	x		x	x					
31	BS	x	x		x					x	x	x	x	x		x		
32	END																	
33	SLEEK LAKE				x													
34	ROUGHLAND																	
35	AREA 8			x														
36	CARIBOU		x•	x			x										x	
37	BASEBALL	x			x					x								
38	NSFZ	x	x	x	x					x		x	x	x				
39	RANGER									x								
40	FOX	x	x	x	x	x	x			x		x	x	x		x	x	
41	BAR 3	x	x	x	x					x		x						
42	KILLER RABBIT	x	x	x	x					x		x	x					
43	AREA 31	x	x	x	x					x		x	x			x		
44	AREA 29	x	x	x	x					x		x	x					
45	AREA 45	x	x	x	x					x	x	x	x			x		
46	SQUARE LAKE	x	x	x	x		x		x	x	x	x	x	x		x	x	
47	AB	xo		x	xo	x	x	o		xo	x	xo	xo	x		x	x	
48	RD 3	x	x•	x	x	x			•	x		xo	•				■	
49	RD 2	x		x	x	x			x	x		x	x					
50	79-S-16 (LA 4)	xo	x■	x■	o				x■	xo	x	xo	xo	x		x■	x	x
51	RD 6 (LA 12)	x		x	x					x		x						
B	PL/23	•	•	•	•				•	•	•	•	•			•		
C	"83"	o	o	o	o				o									
D	S 1	o	o	o	o				o			•						
E	RD 4	o	■	■	■		o		■	•	o	■	■			•	■	
F	RD 7	•	•	o						•		o						

FIGURE 5-13: Project K-1 grid surveys.

DIAND assessment report: 081733.

PROPERTY

MARJ 1-11 66 B/3,5,6

LOCATION

The claims are north of Marjorie Lake and south of Aberdeen Lake (Fig. 5-12).

HISTORY

Claims MARJ 1-11 were staked in 1983 and cover ground held by Urangesellschaft Canada Ltd. as Prospecting Permit 354 and the BA and MAJ claims between 1975 and 1982. Exploration of the Marjorie-Aberdeen Project between 1975 and 1982 included airborne and ground geophysical surveys, geochemical surveys and geological mapping. Fracture-related uranium concentrations on the AB claims, southeast of the MARJ claims, were drilled in 1982 with discouraging results (Laporte, 1978, 1979, 1983a, c, 1984).

DESCRIPTION

Archean or early Proterozoic granite, gneissic granite and granitic augen gneiss underlie the southern part of the claims. This granitic complex is overlain to the north and west by acid volcanics and subvolcanic intrusions, arkose and conglomerate of the Pitz and Kunwak Formations. Sandstone of the Thelon Formation overlies these rocks in the northern half of the claims.

CURRENT WORK AND RESULTS

Reconnaissance geological mapping, prospecting and lake sediment sampling of the Marjorie Lake-Princess Mary Lake area in 1983 resulted in the discovery of several phosphatic uranium concentrations in Thelon Formation sandstone and the subsequent staking of the MARJ claims. A grid was constructed along the unconformity on the MARJ claims and explored with detailed geological mapping, boulder prospecting, magnetometer, EM-16, EM-16R and scintillometer surveys and overburden sampling.

PROJECT DUBAWNT

Westmin Resources Ltd. Uranium
25 Adelaide St., E 66 B,C,G,H
Toronto, Ont., M5C 1Y2

REFERENCES

Laporte (1978, 1979, 1983a, c, 1984); LeCheminant and others (1984); Tella and Heywood (1983); Tella and others (1983, 1984); Wright (1967).

DIAND assessment reports: 081569, 081571, 081573, 081581, 081596, 081599, 081600, 081612.

PROPERTY

The properties explored are listed in Figure 5-14.

LOCATION

The project extends southwest from Amer Lake to north of Aberdeen Lake (Fig. 5-14).

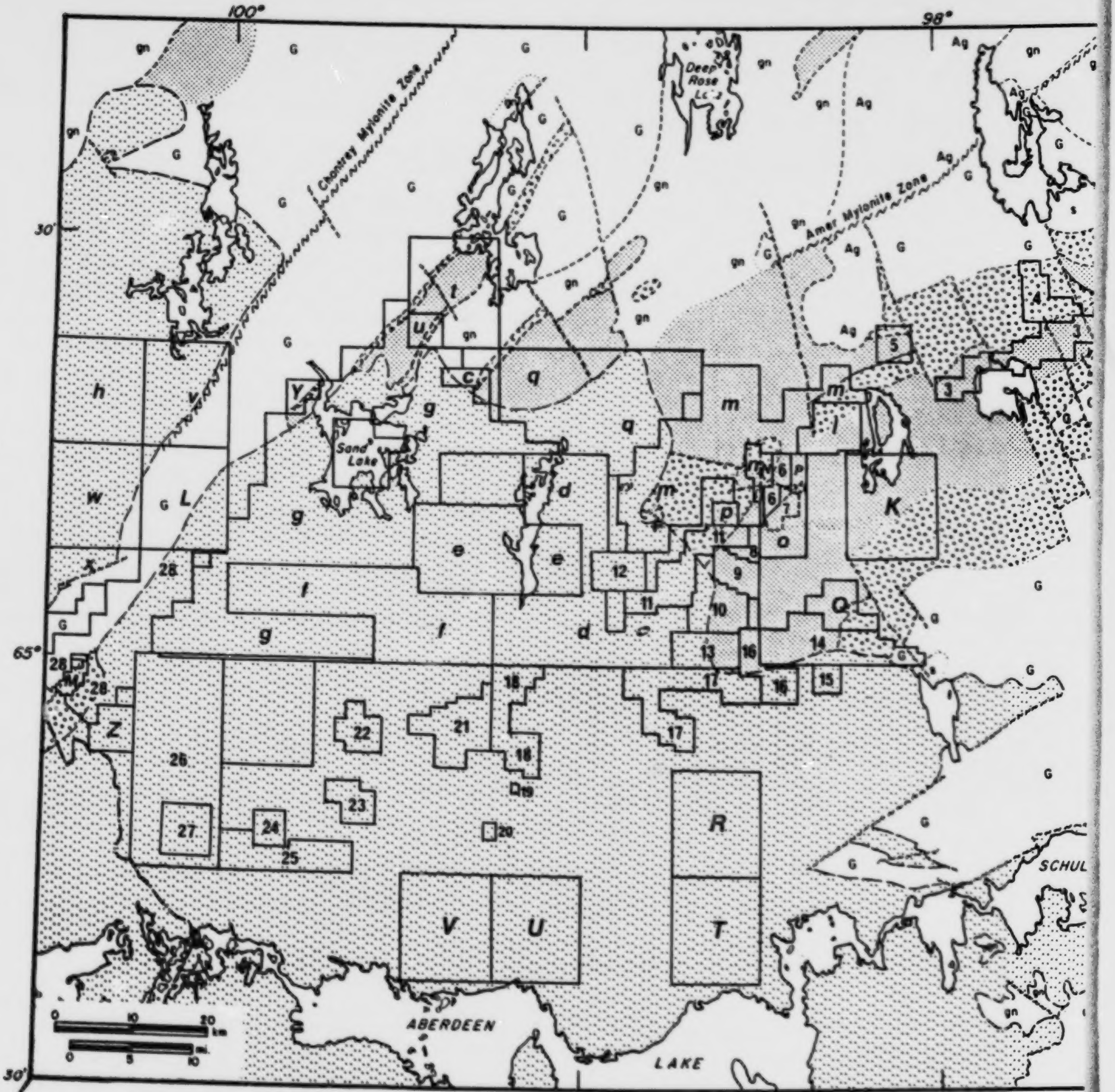
HISTORY

Westmin Resources Ltd. and its precursors have been exploring the project area since 1976 when Prospecting Permits 425 to 427 and the U 1-159 claims were acquired. Prospecting Permit 466 and the AZW 1-30, CAN 1-178, 97 CHE, LIK 1-99, NOR 1-165 and TIB 1-196 claims were acquired in 1977. Prospecting Permits 468, 469, 537 to 542 and the UM 1-8 and WGE 1-4 claims were acquired in 1978. Claims EH, GALLIUM 1-6, GC 1-2, GSE 1-2, LA 1, LAPLAND, LONGSPUR, TERN and WES 1-12 were added in 1979 and another 95 claims in 1980. Prospecting Permits 425 to 427 and 466 expired in 1980, Prospecting Permits 468 and 469 in 1981 and Prospecting Permits 537 to 542 in early 1982. In 1980 and 1981, 126 claims were allowed to lapse. More claims lapsed in 1982 and 1983 (Fig. 5-14).

Geological and geochemical surveys done in 1976 and 1977 led to the discovery of a number of uranium concentrations in Amer Group sediments, one of which was probed with 7 Winkie drill holes (Laporte, 1978, 1979). Geochemical, airborne geophysical and geological work further to the southwest in 1978 and 1979 outlined 14 areas of anomalies requiring follow-up surveys (Laporte, 1983a, c). Seven of these areas were explored with ground surveys in 1980 and 13 holes totalling 1855 m were drilled to obtain stratigraphic information about the Thelon Formation. Detailed airborne geophysical surveys and geochemical surveys were done in 1981. Anomalies detected were prospected (Laporte, 1984).

DESCRIPTION

A 20- to 30-km-wide belt of Aphebian Amer Group orthoquartzite, shale, siltstone, feldspathic sandstone and dolomitic limestone trends southwest in the eastern part of the project area. The sedimentary rocks are flanked by granitic gneisses to the northwest and southeast and are overlain to the southwest by sandstone and pebbly sandstone of the Helikian Thelon Formation.


100°
98°
30'
65°
30'
Chantrey Mylonite Zone
Amer Mylonite Zone
Deep Rose Lake
Sand Lake
ABERDEEN
LAKE
SCHUL
gn
G
Ag
0 10 20 km
0 5 10 mi.

WESTMIN RESOURCES LTD.

1. AZW 14-30*
2. DORA 1-2
3. FENIX 1; MAR 1-18*
4. RAD 1-8
5. EH; LONGSPUR
6. MO 1-2
7. OBOE 1-3*
8. GALLIUM 1-6
9. U 1-159*
10. WES 1-6, 9-12*
11. UM 1-7
12. NOR 1-165*
13. WGE 1-4
14. ITZA 1-11
15. RN 1-2
16. CAN 1-178
17. EXT 1-10*
18. GMF 1-9
19. GMF 10
20. GMF 11
21. AES 1-11
22. GRACE 1-3; SARA 1
23. STEPH 1-4
24. LIK 1-99
25. HELEN 1-9**
26. AUG 1-41**
27. TIB 1-196*
28. UP 1-21*

AQUITAINE COMPANY OF CANADA LTD.

a. 14 BAW*; BRO 1-17*; PRO 1-36*

b. ADO 1-15**; 3 BRE; BRI 1-2; 6 BRU; BRY 1-6

c. JO 18, 19* - BP MINERALS LTD.

CANADIAN NICKEL COMPANY LTD.

d. TM 1-20, 22-35*

e. KS 1-26**

f. JM 1-17, 20-23, 28-31, 36-39**

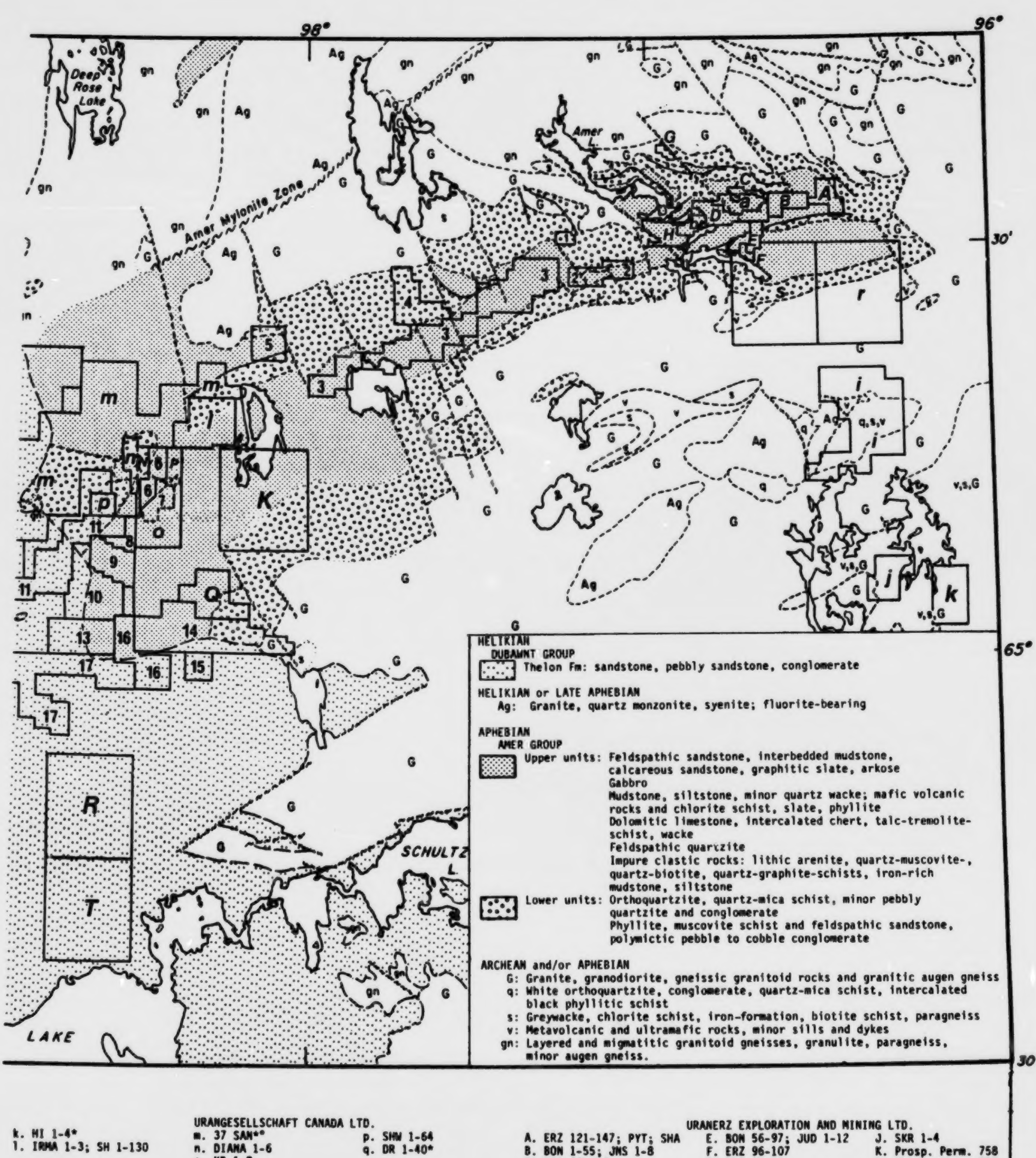
g. SAN 1-96** - MOBIL ENERGY MINERALS LTD.

h. Prosp. Perm. 724* - KIDD CREEK MINES LTD.

i. SYL 1-13 - ESSEX MINERALS COMPANY

j. MOON 1-2 - COMAPLEX RESOURCES INTERNATIONAL LTD.

FIGURE 5-14: Geology and properties, Amer and Sand Lakes area (Geology from Donaldson, 1966; LeCheminant and


98°
96°
30'
65°
30'
Deep Rose Lake
Amer Mylonite Zone
Amer L.
SCHULTZ L.
LAKE
HELIKIAN
DUBAWNT GROUP
Thelon Fm: sandstone, pebbly sandstone, conglomerate
HELIKIAN or LATE APHEBIAN
Ag: Granite, quartz monzonite, syenite; fluorite-bearing
APHEBIAN
AMER GROUP
Upper units: Feldspathic sandstone, interbedded mudstone, calcareous sandstone, graphitic slate, arkose
Gabbro
Mudstone, siltstone, minor quartz wacke; mafic volcanic rocks and chlorite schist, slate, phyllite
Dolomitic limestone, intercalated chert, talc-tremolite-schist, wacke
Feldspathic quartzite
Impure clastic rocks: lithic arenite, quartz-muscovite-, quartz-biotite, quartz-graphite-schists, iron-rich mudstone, siltstone
Lower units: Orthoquartzite, quartz-mica schist, minor pebbly quartzite and conglomerate
Phyllite, muscovite schist and feldspathic sandstone, polymictic pebble to cobble conglomerate
ARCHEAN and/or APHEBIAN
G: Granite, granodiorite, gneissic granitoid rocks and granitic augen gneiss
q: White orthoquartzite, conglomerate, quartz-mica schist, intercalated black phyllitic schist
s: Greywacke, chlorite schist, iron-formation, biotite schist, paragneiss
v: Metavolcanic and ultramafic rocks, minor sills and dykes
gn: Layered and migmatitic granitoid gneisses, granulite, paragneiss, minor augen gneiss.

k. HI 1-4*
l. IRMA 1-3; SH 1-130

URANGESELLSCHAFT CANADA LTD.
m. 37 SAN*°
n. DIANA 1-6
o. KB 1-8
p. SHW 1-64
q. DR 1-40*

r. Prosp. Perm. 664°
s. Prosp. Perm. 663°

UNION OIL COMPANY OF CANADA LTD.
t. Prosp. Perm. 782
u. SAND 1-2
v. Prosp. Perm. 660°
x. Prosp. Perm. 658°
y. SAVAGE 1-14*°

URANERZ EXPLORATION AND MINING LTD.
A. ERZ 121-147; PYT; SHA
B. BON 1-55; JNS 1-8
C. NIP 85-103
D. ERZ 58-95; GRG 1-7; NIP 29-84
E. BON 56-97; JUD 1-12
F. ERZ 96-107
G. ERZ 46-57
H. ERZ 1-45; NIP 1-28
J. SKR 1-4
K. Prosp. Perm. 758
L. Prosp. Perm. 757
M. URA 65-116°

N. GO 1, 3*
P. GO 2*
Q. CHRIS 1-8*

HUDSON'S BAY OIL AND GAS LTD.
R. Prosp. Perm. 721°
T. Prosp. Perm. 718°
U. Prosp. Perm. 720°
V. Prosp. Perm. 719°
W. DRUM 1-3
Y. Prosp. Perm. 756°
Z. TIB 1-4, 7

* partly or totally lapsed in 1982
° partly or totally lapsed in 1983

others, 1984; Tella and Heywood, 1983; Tella and others, 1983 and 1984).

Three types of uranium occurrences have been detected: unconformity vein-type, syngenetic, and sandstone-hosted. The unconformity vein-type showings are narrow stockwork fractures with chlorite, calcite, hematite, kaolinite and quartz in feldspathic quartzite of the Amer Group. Samples of boulders from the RAD claims contain up to 1.6% U_3O_8, but average 0.1% U_3O_8. The syngenetic showings are pore fillings of pitchblende, chalcopyrite, pyrite, magnetite and calcite in sandy interlayers in siltstone of the Amer Group. Grab samples contain up to 2.71% U_3O_8, but these showings generally contain 0.05% U_3O_8 over 2 to 2.5 m width. The sandstone-hosted deposits contain up to 0.1% U_3O_8 associated with various amounts of phosphate. In one area, uranium-bearing breccia zones up to 300 m long occur in the Thelon Formation sandstone.

CURRENT WORK AND RESULTS

Detailed geological, geochemical and geophysical surveys were done in 7 areas in 1982. In Area 2 (ITZA 2 to 4), the grid was extended and a small grid established over an airborne anomaly to the southwest. Both grids were prospected and surveyed with scintillometers. Parts of the main grid were also explored with VLF-EM, IP and magnetometer surveys and a 307-site radon-in-soil survey.

In Area 3, work was done on the R46A anomaly (UM 1 and GALLIUM 1 to 4) and the SN 176 area (UM 6 and WES 4 and 12). The grid on R46A was extended and explored with VLF-EM, magnetometer, IP, radiometric and radon-in-soil surveys. The 531 Track Etch cups collected in 1982 outlined 6 anomalies. The radon survey outlined two anomalies near VLF-EM conductors. In the SN 176 area, geomorphological studies, mapping, prospecting, magnetometer, VLF-EM and IP surveys were done and 853 Track Etch cups planted in 1981 were collected. The radon concentration of the soil was measured at 958 sites. Some of the conductors and low resistivity zones outlined are associated with Track Etch anomalies.

Prospecting of Area 7 (GRACE claims) resulted in the discovery of 4 types of radioactive Thelon Formation sandstone boulders. Uranium occurs in the apatite cement of some boulders, the quartz cement of others, along fractures in a third type and in the pores and clay matrix of the fourth type of boulders. Radioactive phosphatic and porous sandstone boulders also occur in two trains in Area 8 (AES and GMF claims). Very detailed lake geochemical surveys of two lakes in Area 8 as well as underwater radiometric surveys, prospecting and VLF-EM surveys indicate that the anomalous uranium and helium concentrations in the lakes are derived from underneath the lakes and not from surface run-off.

The other 2 areas surveyed are the RAD 1 to 3 claims and the R22 area on the EH and LONGSPUR claims. Radon concentrations in soils were measured at 2500 sites on the RAD claims and 1,141 of the 1,176 Track Etch cups planted in 1981 were recovered. As well, prospecting, IP and VLF-EM surveys and geomorphological mapping were done. Similar surveys were done in the R22 area where 4 boulder trains of radioactive Amer Group sediments were outlined. The boulders consist of feldspathic sandstone with syngenetic uranium concentrations and one train consists of quartzite with epigenetic uranium concentrations in fractures.

VWX PROJECT

Anaconda Canada Explorations Ltd.	Uranium, Gold
1600, 1500 West Georgia St.	66 B/1,2,7,8
Vancouver, B.C., V6G 2Z6	64°15'N,98°30'W

REFERENCES

Donaldson (1969); Laporte (1983c, 1984); LeCheminant and others (1983).

DIAND assessment report: 081607.

PROPERTY

The properties explored are listed in Figure 5-12.

LOCATION

The claims extend from the southeast corner of Aberdeen Lake to the north shore of Mallery Lake (Fig. 5-12).

HISTORY

The V and W claims were acquired by Marline Oil Corporation Ltd. in 1978, the VW claims were added in 1979 and the XW claims in 1980. Exploration in 1979, 1980 and 1981 involved airborne geophysical surveys, reconnaissance geochemical surveys, geological mapping and ground geophysical and geochemical surveys of anomalies and the drilling of 18 holes totalling 2980 m (Laporte, 1983c, 1984). Anaconda Canada Exploration Ltd. became part owners and operators of the project in 1982. The CH claims were staked in 1982 and 12 of the XW 5-23 claims lapsed in 1983.

DESCRIPTION

The northern claims are underlain by sandstones of the Helikian Thelon Formation. The regolith developed below the sandstone is locally radioactive. A belt of Archean and/or early Proterozoic metagreywacke, biotite quartzite, schist, iron-formation and dolomite trends east-northeast in the centre of the claims and underlies the Thelon Formation. Layered gneisses and granite outcrop on the southern claims.

Four showings were drilled in 1980 and 1981, but no economic uranium concentrations were detected. One hole on the Karl Showing cut hematite-quartz iron-formation containing 9.58 ppm Au over 0.86 m. Holes on the Norm, Sandbould and W-2 Showings intersected zones of alteration and brecciation in the granitic gneiss and overlying regolith which enclose minor phosphate and uranium concentrations.

CURRENT WORK AND RESULTS

Geological mapping and prospecting at 1:20,000, detailed surveys on 3 main grids and 7 smaller grids, and the drilling of 24 holes totalling 2,328 m were used to explore the claims in 1982. During the regional mapping, the Aphebian basement was subdivided into:

- foliated quartz-feldspar-biotite gneiss (youngest);
- quartz-feldspar-biotite schist and quartz-biotite schist;
- banded iron-formation including hematite iron-formation, graphite-sericite-pyrite schist, quartzite, quartz-feldspar-garnet-chlorite schist and amphibolite;
- quartz-feldspar schist; and,
- quartz-feldspar-biotite-hornblende gneiss (oldest).

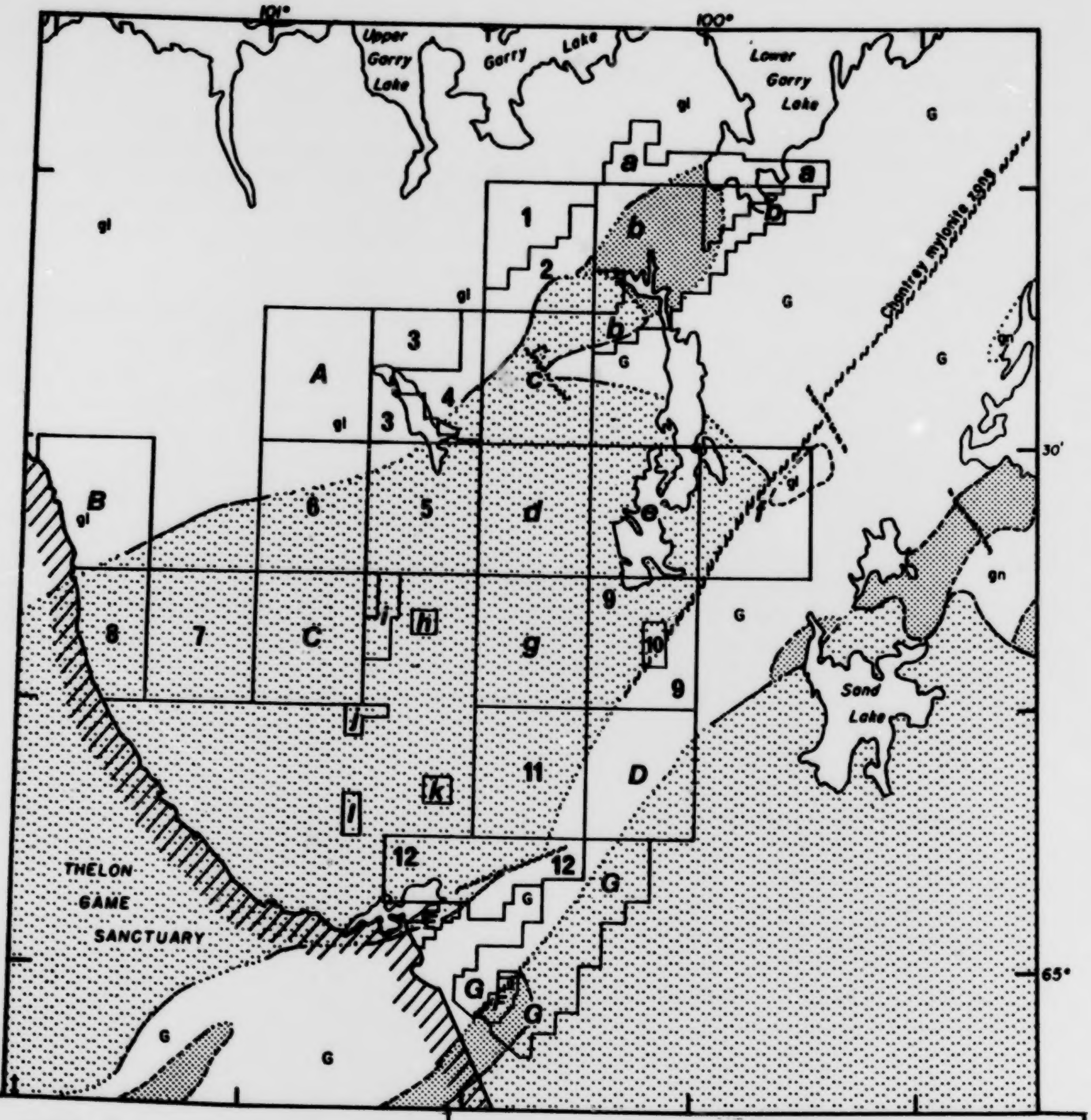
These rocks are intruded and hydrothermally altered by fluorite-bearing granite at the Stan, Ryan and XW-7 Showings.

Nineteen of the 24 holes were drilled on the Karl grid (VW 4 and W 1-4 claims) which was also explored with a 360-site frost boil and till geochemical survey, a 360-site radon and thoron in soil survey, geological mapping at 1:5,000 and VLF-EM, HLEM and magnetometer surveys. Most of the 16 holes drilled in the southern part of the grid to test a 3.5-km length of iron-formation and geochemical or geophysical anomalies contain anomalous gold concentrations over 1 to 27 m thickness. The gold content of the iron-formation and cross-cutting breccia zones ranges up to 2,730 ppb Au over 0.9 m; 7.92 m of core contained 300 ppb Au. The 7 other holes were drilled on the northern part of the grid to test graphitic conductors extending under the Thelon Formation regolith. No gold or uranium concentrations were detected.

The Norm (claim W 23) and Sandbould (claim W 21) Showings were also explored with geophysical surveys, Track Etch surveys and diamond drilling. Two holes drilled to test separate IP and EM anomalies on the Norm Showing intersected barren fractures and breccias in the regolith and basement schists. The hole on the other showing tested a radon anomaly over a VLF conductor, but did not encounter any uranium concentration.

Seven new grids were set up; 4 on INPUT conductors at or near the unconformity on claims W 5 and 6, W 7, W 11 and W 19, and 1 each on the newly-discovered Stan (claims W 23 and XW 24), Ryan (claim XW 22) and XW 7 (claim XW 7) Showings. Only weak conductors were detected during HLEM, VLF-EM and magnetometer surveys of the INPUT anomalies. One hole on claim W 7 intersected hematized chlorite schist without uranium concentrations.

Mapping, VLF-EM, magnetometer and IP surveys were done on the Stan Showing to outline the extent of quartz-pyrite veins found at the metasediment-granite contact. The veins contain minor amounts of fluorite, chalcopyrite, galena, scheelite and possibly native silver. One hole drilled to test a magnetic and resistivity low at the intersection of 2 conductors cut altered gneiss but no economic mineral concentrations. The Ryan Showing is a series of boulder trains of highly altered and sheared gold- and silver-bearing pyritiferous granite. Samples from the boulders which also contain galena, chalcopyrite, sphalerite and possibly enargite contained up to 6,070 ppb Au. VLF-EM surveys outlined 5 conductors, at least 2 of which have coincident resistivity low and chargeability high IP anomalies. The XW 7 Showing is a boulder train of auriferous quartz-pyrite boulders in an area of quartz-feldspar-biotite gneiss outcrops. Eleven boulders contained an average of 986 ppb Au with one boulder containing 6,280 ppb Au.


101°
100°
Upper Garry Lake
Garry Lake
Lower Garry Lake
Chantrey mylonite zone
Sand Lake
THELON GAME SANCTUARY
30'
65°
G
gl
gn
a
b
c
d
e
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g
h
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A
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12

HELIKIAN

⁙ DUBAWNT GROUP
Thelon Formation: sandstone, pebbly sandstone and conglomerate

APHEBIAN

⁙ AMER GROUP: orthoquartzite, dolomitic limestone, mudstone-siltstone, feldspathic sandstone and arkose

APHEBIAN and/or ARCHEAN

G: Granite, massive to weakly foliated, mafic-poor
gn: Hornblende-biotite granite, granodiorite: well-foliated, contains inclusions of gneiss, migmatite, amphibolite and gabbro
gl: Garry Lake Complex: Layered gneiss complex of quartz-feldspar-biotite gneiss, augen gneiss, granodiorite, tonalite and granite gneiss

a. RAY 1-10°
b. GAR 1-30°
c. Prosp. Perm. 649°,LAK 1-15
d. Prosp. Perm. 648°

KIDD CREEK MINES LTD.
e. Prosp. Perm. 647°
f. Prosp. Perm. 650°
g. Prosp. Perm. 724°
h. CON 7°
i. CON 5-6°
j. CON 3-4
k. CON 2
l. CON 1

UNION OIL COMPANY OF CANADA LTD.

Drift Lake West Project
1. Prosp. Perm. 661°
2. SHERYL 1-9
3. Prosp. Perm. 662°
Drift Lake East Project
9. Prosp. Perm. 660°
10. SMLE 1

4. DRIFT 1-7
5. Prosp. Perm. 781°
6. Prosp. Perm. 659°
7. Prosp. Perm. 779°
8. Prosp. Perm. 780°
11. Prosp. Perm. 658°
12. SAVAGE 1-14*°

URANERZ EXPLORATION AND MINING LTD.
A. Prosp. Perm. 825
B. Prosp. Perm. 823
C. Prosp. Perm. 824
D. Prosp. Perm. 757
E. URA 1-64°
F. URA 65-116°

G. UP 1-21° - WESTMIN RESOURCES LTD.

* partly or totally lapsed in 1982. ° partly or totally lapsed in 1983

FIGURE 5-15: Geology and properties, Sand and Garry Lakes area (Geology from LeCheminant and others, 1984).

UP CLAIMS

Westmin Resources Ltd.	Uranium
25 Adelaide St., E	66 C/16; F/1
Toronto, Ont., M5C 1Y2	65°00'N,100°15'W

REFERENCES

Laporte (1984); LeCheminant and others (1984); Tella and others (1984).

DIAND assessment report: 081597.

PROPERTY

UP 1-22	66 C/16;F/1

LOCATION

The claims are north of Beverly Lake and southwest of Sand Lake (Fig. 5-15).

HISTORY

Claims UP 1-22 were staked in June, 1980 for Seru Nucleaire (Canada) Ltd. who explored the property with INPUT and helicopter-borne scintillometer surveys, geochemical lake water and sediment and soil surveys, mapping and prospecting. In 1981 a grid established on an INPUT conductor was tested with prospecting, a detailed geochemical lake water and sediment survey, mapping, magnetometer, resistivity, VLF-EM and gravity surveys, radon-in-soil and frost boil geochemical surveys (Laporte, 1984). The UP 16-21 claims were transferred to Westmin Resources Ltd. and the UP 1-15 and 22 claims allowed to lapse in 1982.

DESCRIPTION

The north shore of Beverly Lake is underlain by Helikian Thelon Formation sandstone. The unconformity between the sandstone and the granitic basement complex trends northeast from north of Beverly Lake across the UP claims to northwest of Sand Lake. A belt of Amer Group sediments outcrops at the unconformity on the claims.

CURRENT WORK AND RESULTS

In 1982, a Westmin Resources Ltd. crew established grid lines intermediate to the existing lines and surveyed them with MaxMin HLEM and VLF-EM. Geological mapping and a 833-site radon-in-soil survey were also done. The main radon anomaly flanks and in part coincides with the main EM conductor. A second anomaly was outlined on the same conductor and a third on a different conductor.

PROSPECTING PERMIT 757

Uranerz Exploration and Mining Ltd.	Uranium
204, 229 - 4th Ave., SW	66 F/1
Saskatoon, Sask., S7K 4K3	65°17'N,100°08'W

REFERENCES

Laporte (1974a, 1979, 1981, 1983a, 1984); LeCheminant and others (1984); Tella and others (1984).

DIAND assessment report: 081590.

PROPERTY

Prospecting Permit 757	66 F/1 NE

LOCATION

The permit area is west of Sand Lake (Fig. 5-15).

HISTORY

The permit, acquired in 1981, covers part of the area previously held by Abidonne Oils Ltd. as Prospecting Permit 100 in 1969 and by Uranerz Exploration and Mining Ltd. as Prospecting Permit 396 from 1976 to 1979. Radiometric and magnetic surveys flown in 1969 did not detect interesting anomalies (Laporte, 1974a). Geochemical lake water and sediment surveys, airborne surveys and geological mapping were used to explore the permit area in 1976 to 1978 (Laporte, 1979, 1981, 1983a). The area was mapped and prospected in 1981.

DESCRIPTION

The permit covers part of a southwest-trending, 8- to 13-km-wide area of massive to weakly foliated granite overlain to the northwest and southeast by sandstones of the Thelon Formation.

CURRENT WORK AND RESULTS

A 276 line-km INPUT survey and a 240 line-km VLF-EM and radiometric survey flown in 1982 outlined 3 weak INPUT conductors and 7 weak radiometric anomalies. A 13-sample lake sediment survey outlined some base metal anomalies. No showings were discovered during geological mapping and prospecting of the area. The results of ground surveys done in 1983 were not reported.

DRIFT LAKE EAST PROJECT

Union Oil Company of Canada Ltd.	Uranium
335 - 8th Ave., SW	66 F/1,2,8
Calgary, Alta., M5K 2K6	$65^{o}13'$N,$100^{o}20'$W

REFERENCES

Laporte (1984); LeCheminant and others (1984); Tella and others (1984).

DIAND assessment report: 081411

PROPERTY

Prospecting Permit 658	66 F/1 NW
SAVAGE 1-14	66 F/1,2
Prospecting Permit 660, SMLE	66 F/8 SE

LOCATION

The properties are west of Sand Lake (Fig. 5-15).

HISTORY

The two permits were acquired in early 1980 and the SAVAGE claims were staked in August. A lake sediment and water geochemical survey in 1980 was followed by a helicopter-borne VLF-EM and radiometric survey in 1981. An INPUT and magnetometer survey was also flown on the SAVAGE claims in 1981. Detailed geochemical surveys and prospecting indicated that most of the radiometric and geochemical anomalies are caused by uranium and phosphate concentrations in the Thelon Formation.

The SMLE claim was staked in 1982 and the permits lapsed in 1983. The SAVAGE claims lapsed in 1982 and 1983.

DESCRIPTION

The permits and claims cover the southeastern edge of a northeast-trending basin of Thelon Formation sandstone and conglomerate. The Helikian clastic rocks unconformably overlie massive to weakly foliated granite of Archean or Aphebian age.

CURRENT WORK AND RESULTS

A 36-site geochemical lake water and sediment survey and prospecting were used in 1982 to explore a geochemical anomaly detected in 1980 on Prospecting Permit 660. The anomaly was confirmed but remains unexplained. The SAVAGE claims and some radiometric anomalies on Prospecting Permit 658 were prospected.

PROSPECTING PERMIT 823

Uranerz Exploration and Mining Ltd.	Uranium
204, 229 - 4th Ave., SW	66 F/6
Saskatoon, Sask., S7K 4K3	$65^{o}26'$N,$101^{o}22'$W

REFERENCES

Laporte (1981, 1983a); LeCheminant and others (1984).

DIAND assessment report: 081588.

PROPERTY

Prospecting Permit 823	66 F/6 NW

LOCATION

The permit is west-northwest of Sand Lake (Fig. 5-15).

HISTORY

The permit was acquired in 1982 and covers ground held by Uranerz Exploration and Mining Ltd. as Prospecting Permit 445 from 1977 to 1980. Geochemical, geophysical and geological surveys along the sub-Thelon Formation unconformity in 1977 and 1978 failed to outline uranium concentrations of interest (Laporte 1981, 1983a).

DESCRIPTION

The unconformity between Thelon Formation sandstone and the layered and migmatitic gneisses of the basement complex trends northeast in the southeastern corner of the permit area.

CURRENT WORK AND RESULTS

Reconnaissance geological mapping, prospecting, a 45-sample lake sediment survey, 72.25 line-km of INPUT along lines at 2 km spacing and 216 line-km of VLF-EM and radiometric surveys flown along lines at 1 km spacing were used to explore the permit in 1982. Five lake sediment samples enriched in uranium, 4 weak INPUT responses and 53 radiometric anomalies were detected. The radiometric anomalies were investigated and correspond to drift/outcrop or drift/boulder field contrasts.

A 10-man crew investigated anomalies on the prospecting permit in 1983 but the result of this work was not reported.

PROSPECTING PERMIT 824

Uranerz Exploration and Mining Ltd.	Uranium
204, 229 - 4th Ave., SW	66 F/7
Saskatoon, Sask., S7K 4K3	65°18'N,100°53°W

REFERENCES

LeCheminant and others (1984).

DIAND assessment report: 081592

PROPERTY

Prospecting Permit 824	66 F/7 SW

LOCATION

The permit is west of Sand Lake (Fig. 5-15)

HISTORY

Prospecting Permit 824 was acquired in 1982.

DESCRIPTION

Sandstone of the Thelon Formation underlies the area.

CURRENT WORK AND RESULTS

Geological mapping and prospecting, a 49-sample lake sediment survey, 264 line-km of INPUT along lines at 800 m spacing and 177 line-km of VLF-EM and radiometric surveys were done on the permit area in 1982. Four INPUT anomalies were detected, but no geochemical anomalies.

The results of ground surveys done in 1983 were not reported.

DRIFT LAKE WEST PROJECT

Union Oil Company of Canada Ltd.	Uranium
335 - 8th Ave., SW	66 F/6,7,9,10
Calgary, Alta., T2P 2K6	65°33'N,100°37'W

REFERENCES

Laporte (1979, 1981, 1983a, 1984); LeCheminant and others (1984).

DIAND assessment report: 081411.

PROPERTY

Prospecting Permits 779 and 780	66 F/6 S
Prospecting Permits 659 and 781	66 F/7 N
Prospecting Permit 662, DRIFT 1-7	66 F/9 SE
Prospecting Permit 661, SHERYL 1-9	66 F/10 NW

LOCATION

The properties are west of Sand Lake (Fig. 5-15).

HISTORY

Prospecting Permits 659, 661 and 662 were acquired in 1980 and the others in 1981. The DRIFT and SHERYL claims were staked in 1982. All the prospecting permits expired or were relinquished in 1983.

Parts of the project area were held by Uranerz Exploration and Mining Ltd. in 1976 to 1979 and Essex Minerals Company in 1978. Geochemical, geophysical and geological surveys did not outline interesting concentrations of uranium (Laporte, 1979, 1981, 1983a). In 1980, geochemical anomalies worthy of further study and several small fracture-controlled uranium showings in the basement gneisses were discovered on Prospecting Permits 659 and 662. INPUT surveys in 1981 outlined conductors within the Amer Group sediments but no radioactive boulders were found associated with these anomalies (Laporte, 1984).

DESCRIPTION

The unconformity between Helikian Thelon Formation sandstone and conglomerate and the Archean and Aphebian granitic basement complex trends northeast along the west edge of the properties. Aphebian Amer Group sediments extend southwest under the Thelon Formation on Prospecting Permits 661 and 662.

CURRENT WORK AND RESULTS

Three geochemical anomalies on Prospecting Permits 780 and 781 were prospected in 1982. Twenty-four lakes in the vicinity of the anomaly on Prospecting Permit 781 were resampled but no anomalies were detected.

Three grids were established over INPUT conductors on Prospecting Permits 661 and 662 and explored with prospecting, soil, lake water and sediment surveys and MaxMin EM, VLF-EM and magnetometer surveys. The 934 soil samples collected were analyzed for U, Pb, Ni, As and Po_{210}. Two areas of Prospecting Permit 661 have soil and lake geochemical anomalies overlying conductors.

GARRY LAKES PROJECT

Kidd Creek Mines Ltd.	Uranium
Box 175, Commerce Court West	66 F/8,9,16;
Toronto, Ont., M5L 1E7	G/5,12,13
	65°37'N,100°W

REFERENCES

Laporte (1984); LeCheminant and others (1984); Tella and others (1984).

DIAND assessment reports: 081630, 081640.

PROPERTY

Prospecting Permits 647, 648 and 724	66 F/8
Prospecting Permit 649, LAK 1-15	66 F/9
GAR 1-30	66 F/9; G/12
RAY 1-10	66 F/16; G/13
Prospecting Permit 650	66 G/5 NW

LOCATION

The properties are southwest of Lower Garry Lake and northwest of Sand Lake (Fig. 5-15).

HISTORY

Prospecting Permits 647 to 650 and 724 were acquired in 1980 and expired in 1983. Prospecting Permit 724 was acquired by Hudson's Bay Oil and Gas Company Ltd. and transferred to Kidd Creek Mines Ltd. The GAR and RAY claims were recorded in October and December, 1981. The LAK claims were staked in 1982 and cover the area of Prospecting Permit 649.

VLF-EM and radiometric surveys, geological mapping, prospecting and lake sediment and water surveys were done on the permits in 1980. INPUT and magnetometer surveys and re-sampling of geochemical anomalies were done in 1981. Conductors were explored with ground magnetometer, VLF-EM and HLEM surveys and soil sampling surveys (Laporte, 1984).

DESCRIPTION

Amer Group feldspathic sandstone with interbedded mudstone, calcareous sandstone, graphitic slate and arkose outcrop southwest of Lower Garry Lake and is overlain to the southwest by Thelon Formation sandstone. The Aphebian metasediments are underlain to the east by massive to weakly foliated granite and to the west by layered granitic gneisses of the Garry Lake Complex.

CURRENT WORK AND RESULTS

In 1982, a grid was established on the GAR and RAY claims and part of Prospecting Permit 649 and explored with boulder prospecting, VLF-EM, scintillometer, magnetometer and MaxMin EM surveys, a low-level helicopter-borne radiometric survey and a 174-site soil geochemical survey. Eight holes totalling 1038 m were drilled in 5 sections across the INPUT anomalies along the edges of the basin of Amer Group sediments to test the anomalies and determine the stratigraphy. Graphitic metasediments cause the conductors but do not contain uranium concentrations. A narrow train of radioactive boulders and a corresponding soil geochemical anomaly were traced for 3 km. The boulders of altered (hematite and kaolinite) and fractured arkose contain 0.87 to 25.25% U_3O_8. Some of the boulders also contain copper and molybdenum concentrations.

Three hundred Track Etch cups, buried in 1982, were collected during a brief prospecting program in 1983.

PROSPECTING PERMIT 825

Uranerz Exploration and Mining Ltd.	Uranium
204, 229 - 4th Ave., SW	66 F/10
Saskatoon, Sask., S7K 4K3	65°34'N,100°53'W

REFERENCES

LeCheminant and others (1984).
DIAND assessment report: 081591.

PROPERTY

Prospecting Permit 825	66 F/10 SW

LOCATION

The permit is southwest of Lower Garry Lake (Fig. 5-15).

HISTORY

Prospecting Permit 825 was acquired in 1982.

DESCRIPTION

The permit covers layered and migmatitic granitoid gneisses northwest of their contact with the overlying Thelon Formation sandstone.

CURRENT WORK AND RESULTS

Airborne surveys, 258 line-km of VLF-EM and radiometric at 1 km spacing and 11.25 line-km of INPUT, a lake sediment geochemical survey during which 25 samples were collected, mapping and prospecting were done in 1982. Most of the 32 radiometric anomalies prospected correspond to concentrations of granite and pegmatite boulders. One outcrop of granite gneisses encloses chlorite-rich shear zones; samples of which contained 680 ppm U_3O_8 and 1700 ppm ThO_2. Thirteen samples of lake sediment contained anomalous concentrations of base metals.

The anomalies detected in 1982 were prospected in 1983.

PROSPECTING PERMIT 758

Uranerz Exploration and Mining Ltd.	Uranium
204, 229 - 4th Ave., SW	66 G/1
Saskatoon, Sask., S7K 4K3	65°11'N,98°07'W

REFERENCES

Laporte (1984); Tella and others (1983).

DIAND assessment report: 081589.

PROPERTY

Prospecting Permit 758	66 G/1 ½E

LOCATION

The permit area is north-northwest of Schultz Lake (Fig. 5-14).

HISTORY

Prospecting Permit 758 was acquired in 1981 and explored with geological mapping and prospecting (Laporte, 1984).

DESCRIPTION

The northwestern half of the permit area is drift covered and the southeastern part is underlain by white orthoquartzite of the Amer Group.

CURRENT WORK AND RESULTS

A 263 line-km INPUT survey flown in 1982 along lines 800 m apart detected one strong conductor in the southeast corner of the permit area. A helicopter-borne VLF-EM and radiometric survey along 285 km of lines 1 km apart detected a few radiometric anomalies but no VLF anomalies. Twenty-six lake sediment samples were collected and the permit area was mapped and prospected. MaxMin EM surveys of the INPUT anomaly detected 1 conductor.

Ground geophysical surveys and prospecting were done in 1983 but the results are unknown.

JM, TM and KS CLAIMS

Canadian Nickel Company Ltd.	Uranium
c/o Inco Metals Company	66 G/2,3,4
Copper Cliff, Ont., POM 1NO	65°05'N,99°15'W

REFERENCES

Laporte (1984); Tella and others (1983, 1984).
DIAND assessment report: 081560.

PROPERTY

TM 1-20, 22-35	66 G/2,3
KS 1-26	66 G/3
JM 1-17, 20-23, 28-31, 36-39	66 G/3,4

LOCATION

The claims extend east from south of Sand Lake across Naujatuuq Lake (Fig. 5-14).

HISTORY

The TM claims were staked in August, 1979, the JM claims in March, 1980, and the KS claims in May, 1980. Claim TM 21 lapsed in 1981 and all but TM 2-7, 15-18, 22 and 31-35 lapsed in 1982. The KS claims lapsed in 1982 and 1983 as did all but the JM 2-5 claims.

Airborne geophysical surveys, geochemical surveys and detailed geological, geochemical and geophysical surveys were used to explore the claims in 1981 and 1982 (Laporte, 1984).

DESCRIPTION

The claims cover the extension of a belt of Aphebian Amer Group metasediments under the Thelon Formation sandstone. The unconformity between the two rock sequences trends northwest in the northeastern corner of the TM claims.

The 1981 program outlined three areas of interest. On grid TM-3, a 3.4-km-long HLEM conductor is believed to correspond to graphitic or sulphide-rich horizons in the basement complex. Short VLF-EM conductors on the grid represent shear zones or surficial features. On the Dop Lake grid (claim TM 34) lake sediment samples containing up to 7260 ppm He were collected. The third target area is the Slingshot Lake grid (claim TM 16) where numerous radioactive sandstone and conglomerate boulders were discovered and a 900-m-long radon anomaly was outlined by an Alphacard survey (Laporte, 1984).

CURRENT WORK AND RESULTS

In 1982, the three grids were explored with lake bottom water and sediment sampling, Alphacard radon-in-soil surveys, refraction seismic, gravity, HLEM and VLF-EM surveys, till sampling and prospecting. On the Dop Lake grid, a 692-site lake geochemical survey outlined good helium, uranium and radon anomalies but the seismic survey indicates depth to basement is greater than 300 m. No gravity, VLF-EM or Alphacard anomalies were detected and the only HLEM anomalies were attributed to conductive lake sediments. On the Slingshot Lake grid, depth to basement is between 100 and 300 m and the Alphacard anomalies appear to be related to boulder concentrations. The basement is less than 30 m deep on the TM-3 grid and 2 Alphacard anomalies were outlined near the main EM conductor.

DEEP ROSE PROJECT

Urangesellschaft Canada Ltd.	Uranium
3100, 2 Bloor St., E	66 G/2,7,8
Toronto, Ont., M4W 1A8	65°12'N,98°55'W

REFERENCES

Laporte (1977, 1978, 1979, 1981, 1983a, c, 1984); Shilts (1984); Taylor (1978); Tella and others

(1983).

DIAND assessment reports: 081598, 081675, 081731.

PROPERTY

The properties explored are listed in Figure 5-14.

LOCATION

The project covers the area east of Sand Lake (Fig. 5-14).

HISTORY

Urangesellschaft Canada Ltd began exploring the area in 1974 when Metallgesellschaft Canada Ltd., an affiliate, acquired Prospecting Permit 326 and 327 covering NTS areas 66 G/1 and 8. Prospecting Permit 356 (66 G/2) was acquired in 1976 as were the SH 1-130 claims. Prospecting Permit 378 (66 G/3) and the SHW 1-64 claims were acquired in 1977. Lake sediment and water geochemical surveys, airborne radiometric surveys, mapping and prospecting led to the discovery of a field of uranium-bearing boulders on the SH claims. A grid established on the claims in 1977 was explored with geological mapping, VLF-EM and IP surveys and A_0 horizon geochemical surveys (Laporte 1977, 1978, 1979, 1981; Taylor 1978).

In 1978, a radiometric, VLF-EM and magnetic survey was flown northwest of the SHW claims and the IRMA 1-3 and SAN 1-49 claims were staked to cover anomalies. A second survey flown in 1979, geological mapping and prospecting led to the discovery of 9 uranium showings, three of which were gridded and explored with one or more of the following surveys: soil sampling, radiometric, magnetometer, VLF-EM and HLEM surveys and geological mapping. Eight holes totalling 924.8 m were drilled to locate the source of the boulders on the SH claims (Laporte, 1983c). The PEG 1-8 claims were added to the property in 1979.

A third VLF-EM, magnetometer and radiometric survey was flown and the DR 1-40 claims were staked in 1980. Four new grids and extensions to 3 of the 1979 grids were established and explored with VLF-EM, magnetometer, HLEM, prospecting, mapping, Alpha Nuclear and Track Etch radon measurements and soil geochemical surveys. Another 5 grids and extensions were established in 1981 and explored as in 1980. Gravity surveys were also done (Laporte, 1984).

The PEG and 13 SAN claims lapsed in 1981, the DR and 2 SAN claims in 1982 and one more SAN claim in 1983. The DIANA 1-6 and KB 1-8 claims were staked in 1983.

DESCRIPTION

The properties cover the unconformable contact between southwest-trending Aphebian Amer Group metasediments and the overlying Helikian Thelon Formation sandstone and conglomerate. The Amer Group rocks include orthoquartzite and quartz-mica schist overlain by feldspathic sandstone with interbedded mudstone, calcareous sandstone, siltstone, graphitic slate and arkose. These rocks are deformed into a series of upright to overturned synclines and anticlines and enclose gabbro sills which outcrop in the southeastern part of the claims.

Taylor (1978) recognized 4 rock types in the area of the uranium showing on the SH claims:

- thin siltstone and mudstone beds interbedded with thin, crenulated hematitic arkosic arenites;
- fine-grained, pink hematitic arkosic arenite with a few thin light green to brown mudstone interbeds;
- dolomitic sandstone with a few pink arkosic sandstone interbeds; and
- grey to black siltstone with a few grey mudstone interbeds and irregular lenses of purple, hematitic, arkosic sandstone containing disseminated magnetite and pyrite.

Uraninite, the major uranium-bearing mineral, occurs near or within magnetite-ilmenite grains and, mainly, as disseminations in the matrix of the interbedded siltstone-arkose layers. Where the clasts are relatively far apart and porosity was sufficient, uraninite is in layers paralleling the outline of the pore or veinlet. Some pitchblende is present as large aggregate massive blebs with random shape in areas of high uraninite concentration. Taylor (1978) attributes the deposition of the uraninite to a low temperature hydrothermal replacement event associated with regional metamorphism. The pitchblende was deposited during local remobilization of the uranium. The 1979 drilling was done along 2 sections 400 m apart and the best intersection was 0.2% U_3O_8 over 0.3 m. Estimated ore reserves on the grid are 900,000 tonnes grading 0.104% U_3O_8.

CURRENT WORK AND RESULTS

Three new grids were established in 1982 and, along with 5 previously established grids, were explored with a number of geochemical and geophysical surveys. One of the new grids covers trains of pitchblende nuggets and dolomite boulders containing pitchblende, hematite, sulphides and arsenides. Another covers coincident EM and radiometric anomalies detected during the 1980 airborne surveys. On the previously established grids, the ground surveys outlined geochemical anomalies and coincident HLEM conductors displaced along VLF-EM conductive zones. A detailed petrographic analysis of the core from one hole drilled in 1979 was also done.

In 1983, geological and surficial mapping and till sampling was completed over most of the clains. Three trains of radioactive boulders were discovered. Glacial mapping, prospecting and till sampling of the western claims outlined a few geochemical anomalies attributed to uranium-phosphate enrichment in Thelon Formation sandstone boulders.

PROSPECTING PERMIT 782

Union Oil Company of Canada Ltd.	Uranium, Gold
335 - 8th Ave., SW	66 G/6
Calgary, Alta., T2P 2K6	65°26'N,99°23'W

REFERENCES

Tella and others (1983, 1984).

DIAND assessment report: 081411.

PROPERTY

Prospecting Permit 782, SAND 1-2 66 G/6 NW

LOCATION

The properties are north-northeast of Sand Lake (Fig. 5-14).

HISTORY

The prospecting permit was acquired in 1981 and the claims in August,1983. The permit was explored in 1981 with an INPUT and magnetometer survey, lake sediment sampling, geological mapping and prospecting.

DESCRIPTION

The permit covers a southwest-trending syncline of Amer Group sediments flanked to the southeast and northwest by a basement complex of well foliated to massive granite, granodiorite and quartz monzonite. Orthoquartzite outcrops on both limbs of the fold and is overlain by mudstone, siltstone and minor quartz wacke. The core of the syncline consists of feldspathic sandstone with interbedded mudstone, calcareous sandstone, siltstone, graphitic slate and arkose. Gabbro sills occur below the feldspathic sandstone on the northwest limb of the syncline.

A sample collected in 1981 from Showing 81-02, a quartz stockwork in Aphebian sediments, contained 6.4 ppm Au.

CURRENT WORK AND RESULTS

Prospecting of Showing 81-02, in 1982, yielded disappointing results with all but one of the grab samples containing less than 75 ppb Au and nil U_3O_8. The only interesting sample contained 330 ppb Au and 3000 ppm U_3O_8. Some lake water and sediment samples from the vicinity of an INPUT conductor were enriched in U.

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CHAPTER 6: SOUTHEAST MACKENZIE DISTRICT

Walter A. Gibbins, District Geologist,
Northern Affairs Program, Yellowknife, NWT.

INTRODUCTION

In 1982-83, the Arctic Islands District Geologist continued to monitor mineral exploration in the southeastern District of Mackenzie. This area includes Paleozoic carbonates of the Great Slave Plain, where lead-zinc is the main exploration target, and part of the Churchill Province of the Precambrian Shield, where uranium has been the principle commodity sought. Relative to 1980-81, the 1982-83 field seasons saw a drastic decrease in uranium exploration in the Western Thelon Plain, the East Arm and Nonacho Lake areas. Lead-zinc exploration in the Great Slave Plain was also reduced as exploration was focused mainly in areas of previously discovered deposits. In contrast, there was increased exploration for base and precious metal deposits in the Churchill Province and a continued strong exploration effort at Highwood Resources Ltd.'s niobium-tantalum-beryllium-rare earth deposits in the Blatchford Lake Complex.

THE WESTERN THELON PLAIN

The Western Thelon Plain includes most of the Thelon River drainage basin within the eastern District of Mackenzie and corresponds to the southwestern half of the Thelon Basin (Fig. 6-1). The northern part of this area lies within the Thelon Game Sanctuary, where mineral exploration is not permitted. The southern part, which is extensively covered by glacial deposits (Craig, 1964) has been intermittently explored for uranium since 1969 (Laporte, 1974a).

The Dubawnt Basin is a large, structural-sedimentary basin defined by the various units of the Helikian (Middle Proterozoic) Dubawnt Group, (Curtis and Miller, 1979). In the Western Thelon Plain, the lower and middle units of the Dubawnt Group are absent, and the Thelon Basin is characterized by sparse flat-lying outcrops of the Thelon Formation,

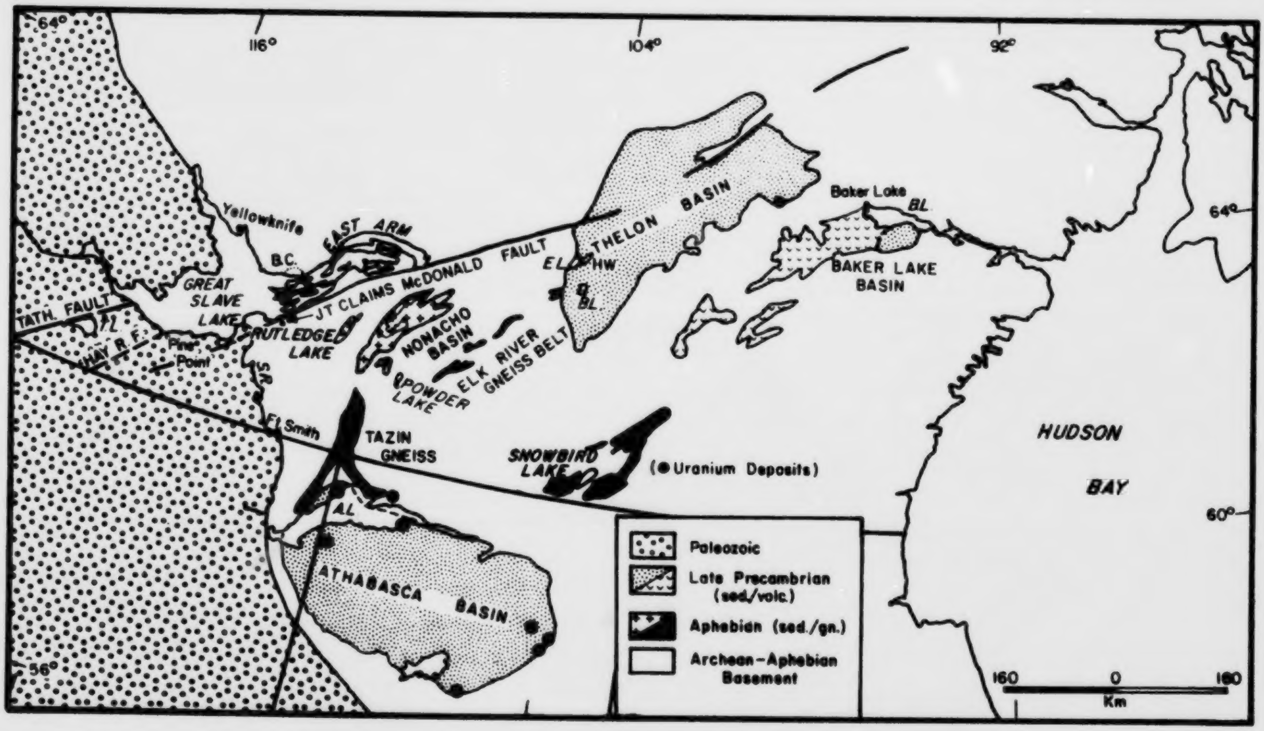
64°
116°
104°
92°
64°
60°
56°
Yellowknife
EAST ARM
B.C.
GREAT SLAVE LAKE
TATH. FAULT
HAY R. F.
Pine Point
SR
Ft. Smith
JT CLAIMS McDONALD FAULT
RUTLEDGE LAKE
NONACHO BASIN
POWDER LAKE
ELK RIVER GNEISS BELT
EL
HW
BL
THELON BASIN
Baker Lake
BL
BAKER LAKE BASIN
TAZIN GNEISS
SNOWBIRD LAKE
(● Uranium Deposits)
AL
ATHABASCA BASIN
HUDSON BAY
Paleozoic
Late Precambrian (sed./volc.)
Aphebian (sed./gn.)
Archean-Aphebian Basement
160
0
160
Km

FIGURE 6-1: Map of the Southeast Mackenzie District, Dubawnt and Athabasca Basins. BL - Beaverhill Lake, EL - Eyeberry Lake, AL - Lake Athabasca, BC - Blatchford Complex, HW - Hurwitz quartzite, SR - Slave River.

the upper unit of the Dubawnt Group. It consists mainly of sandstone (quartz arenite and orthoquartzite) and includes a basal conglomerate associated with pebbly sandstone and volcanic-rich lithic sandstone (Donaldson, 1965, 1969). A well-developed regolith is generally present at the contact between the Thelon Formation and underlying Aphebian-Archean basement (Table 6-1). Small outliers of Thelon Formation are common near the margin of the Thelon Basin and an inlier of white quartzite that has tentatively been correlated with the Aphebian (Lower Proterozoic) Hurwitz Group (Table 6-1) forms a prominent ridge northeast of Eyeberry Lake, (HW in Fig. 6-1).

The Thelon Formation is similar to, and possibly correlative with, the Athabasca Formation to the south in northern Saskatchewan. The Athabasca Basin has been the focus of intensive uranium exploration for several years, and numerous uranium deposits and showings have been found (Dahlkamp, 1979).

The basement rocks are intrusive granites and granodiorites separated by belts of metasedimentary and metavolcanic gneisses of Lower Proterozoic age (1.6 to 1.8 b.y. BP.). The latter are considered favourable targets for unconformity-related uranium deposits of the Key Lake-Rabbit Lake type (Dahlkamp, 1978).

TABLE 6-1: FORMATIONS - WESTERN THELON PLAIN.

Helikian	Diabase and related dike rocks
	DUBAWNT GROUP: dolostone; silicious dolostone; basalt
	Thelon Formation: sandstone; pebbly sandstone, conglomerate; minor siltstone; mudstone
	~~unconformity (regolith)~~~~~
Aphebian	HURWITZ GROUP: quartzite; minor siltstone
	Aphebian Basement: ultramafics; mafic, intermediate and felsic gneiss; pelitic and calcareous gneiss; intrusive rocks (granite, granodiorite, undifferentiated granitoid gneiss and Muskeg Lake Granite)
Archean	Archean Basement: gabbro, diorite, quartz diorite, granodiorite, granite

In 1982 and 1983, mineral exploration was considerably less than the 1980-1981 period, when up to eight companies had field crews in the Thelon Basin area, whereas only two companies were active in 1982-83. This decrease, which can be related to the decrease in energy prices brought on by the onset of the 1982 economic recession and a world-wide surplus of uranium, is reflected in the decrease in the number of prospecting permits taken out in the Thelon Basin. Sixteen permits were taken out in 1980 and six in 1981, but none in 1982 and 1983. An appreciation for the suddenness and magnitude of this decrease can be obtained by comparing the area of claims and prospecting permits in good standing and actively explored in 1982 or 1983 (Fig. 6-2) with 1981 mineral holdings (Fig. 6-3).

DUBAWNT BASIN PROJECT

Urangesellschaft Canada Ltd.	Uranium
#3100, 2 Bloor St. E.	65 L,M; 75 I,P
Toronto, Ont., M4W 1A8	62°00'-63°30'N
	102°30'-105°30'W

REFERENCES

Curtis and Miller (1980); Donaldson (1965, 1969); Gibbins (1983a,b, 1984); Laporte (1974, 1979, 1981); Padgham and others (1978); Wright (1967).

PROPERTY

Numerous claim groups. See Fig. 6-2 and succeeding sections.

LOCATION

The claims lie south of the Thelon Game Sanctuary in the upper Thelon River-Beaverhill Lake-Mosquito Lake area, 560 km east of Yellowknife. Most of the claims cover the Thelon Formation-basement contact (Fig. 6-2).

HISTORY

Several permits were acquired and explored in the Thelon area during the uranium boom of 1968-1969, however, no significant uranium concentrations were detected (Laporte, 1974a and Padgham and others, 1978). Urangesellschaft Canada Ltd. did reconnaissance geological surveys in 1975 and acquired 10 prospecting permits in 1976, 5 in 1977, 6 in 1978 and 8 in 1979. Results of reconnaissance geological, geochemical and radiometric surveys on the permits (Laporte, 1979, 1981 and Gibbins, 1983a) prompted the staking of the JOE, AL, LYNN, ROB, WAWA, GERY, BART, DEAN, DENIS, MARY, MIKE, MILT and TOM claim groups. Permits 458 to 461 lapsed at the end of 1979, but parts of Permits 459, 460 and 461 were retained as the ART, CHARLY and PET claims. When Permits 492-497 lapsed at the end of 1980, parts of Permits 494-496 were retained as the HANK claims, 492 as the EVA claims and 493 as the CHUCK claims. Permits 632, 636-637 and 640 were relinquished at the beginning of 1981 and the remainder at the beginning of 1982.

Summaries of work done on the Dubawnt Basin Project in 1979-81 are given in Gibbins (1983b, 1984).

After the 1981 field season, Urangesellschaft Canada Ltd.'s Dubawnt project incorporated the Boomerang Lake Project of Hudson Bay Oil and Gas Ltd. in a joint venture project that also involved Alberta Energy Co. Ltd. The 1982-83 work was basically confined to the western margin of the Thelon Basin, where it intersects the Elk River Gneiss Belt (Fig. 6-1). The area corresponds to the Boomerang Grid (LEM claims of Hudson Bay Oil and Gas Ltd., Fig. 6-4) and the adjoining Elk River Grid (ART claims of Urangesellschaft Canada Ltd.).

The NIT 1-6 (75 I/10) and ARF 1-2 claims (75 I/11) (Fig. 6-2) were staked in 1982. The NIT claims cover the northwest corner of Prospecting Permit 725, held by Hudson Bay Oil and Gas from 1980 to 1983.

DESCRIPTION

The Dubawnt project lies within the Churchill Structural Province and is underlain primarily by an Archean basement complex consisting mainly of steeply dipping gneisses and impure granitic rocks (Wright, 1967).

Several quartz diorite, diorite and gabbro bodies intrude the gneiss. The relatively unaltered mineral assemblage of these intrusions suggests that they are probably Aphebian or younger in age. Their mineralogical composition and metamorphic assemblage are lower grade than most of the other basement gneiss. An orthoquartzite ridge surrounded by Thelon Formation east of Eyeberry Lake has been tentatively identified as Aphebian Hurwitz quartzite.

The Paleohelikian Dubawnt Group lies unconformably on the igneous, metamorphic and deformed sedimentary rocks described above. The Dubawnt Group consists of flat-lying unmetamorphosed Thelon sandstone and conglomerate. Dubawnt volcanics (Pitz Fm.) have also been observed in the southern section of the project area. They consist mostly of trachytes with minor lamprophyre, dacite and andesite dykes and frost-heaved boulders.

Diabase dykes present in several locales are believed to be the youngest rocks in the project area.

A mantle of loose blocks and boulders covers much of the area. Deposits of till and outwash sand and gravel are widespread. Glacial landforms such as eskers and drumlins are common, and together with striated and grooved bedrock provide a clear indication of the southwesterly direction of ice movement. Eskers and outwash are characterized by active sand dunes. Abandoned Pleistocene beaches flank many of the hills several tens of feet above the present water level.

The 'western claims' are those that either cover the western margin of the Thelon Basin or lie further to the west (Fig. 6-2). These claims are mainly underlain by Archean-Aphebian paragneiss containing narrow zones of cataclasite and mylonite. Mafic to felsic metavolcanics are interbedded with garnet-biotite gneiss near southeastern Cruikshank Lake in NTS area 75 P/11. A 1978 airborne VLF-EM survey on Permits 494 to 497 outlined four conductors corresponding to cataclastic zones that appear to be related to the northeast extension of the McDonald Fault Zone. One uranium showing, the Hanbury showing, is in a cataclastic zone near the boundary of the Thelon Game Sanctuary, about 8 km west of the Archean-Helikian unconformity and 8 km east of Cruikshank Lake. The showing consists of several frost-heaved boulders of highly hematized and brecciated basement rock. Chlorite, carbonate and minor pyrite are present in these boulders. One sample assayed 5.27% U_3O_8 and 0.011% ThO_2.

CURRENT WORK AND RESULTS

The 1982 work was confined to the 'western claims' and consisted mainly of fill-in geophysics (input, magnetic and Track Etch surveys) and geochemistry (polonium in soil samples). The 1983 work was mainly drilling. About 25 holes (2600 m) were drilled on the Elk River and Boomerang grids. Several holes intersected uranium associated with graphitic basement rock.

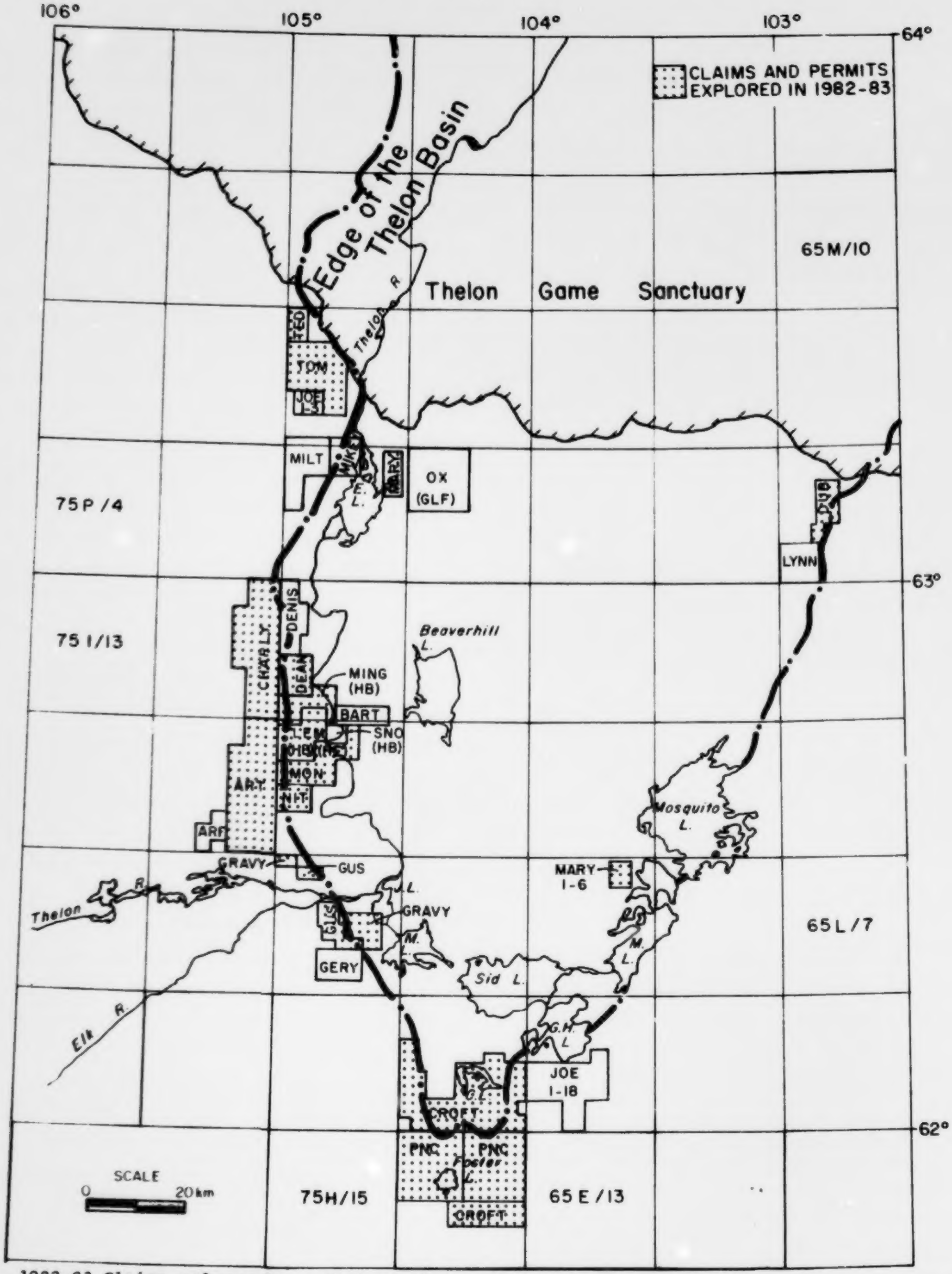
106°
105°
104°
103°
64°
63°
62°
CLAIMS AND PERMITS EXPLORED IN 1982-83
Edge of the Thelon Basin
Thelon R
Thelon Game Sanctuary
65M/10
TEO
TOM
JOE 1-3
MILT
MIKE
MARY
OX (GLF)
E. L.
75P/4
DUB
LYNN
75I/13
CHARLY
DENIS
DEAN
MING (HB)
BART
LEM
AN
SNO (HB)
MON
ART
NIT
ARF
Beaverhill L.
Mosquito L.
GRAVY
GUS
J.L.
MARY 1-6
65L/7
Thelon R
GUS
GRAVY
M. L.
GERY
Sid L.
M. L.
Elk R.
G.H. L.
JOE 1-18
CROFT
PNC
PNC
Foster L.
SCALE
0
20km
75H/15
65E/13
CROFT

FIGURE 6-2: 1982-83 Claims and permits - Western Thelon Plain. JL -Jim Lake, GHL - Gravel Hill Lake, UG - Urangsellschaft Canada Ltd., HB - Hudson Bay Oil and Gas Ltd., GLF - Gulf, P.N.C. - PNC Exploration (Canada) Ltd.

Urangesellschaft Canada Ltd. claims:

ARF	*1-2*	*75I/10,15*	*JOE*	*1-3*	*75P/7*	*MILT*	*1-10*	*75P/2*
BART	*1-8*	*75I/15*	*LYNN*	*2-6*	*65M/2*	*GUS*	*1-10*	*75I/7*
DEAN	*1-6*	*75I/15*	*TOM*	*1-14*	*75P/7*	*JOE*	*1-18*	*75I/10*
DENIS	*1-7*	*75I/15*	*MARY*	*1-4*	*75P/2*	*ART*	*1-25*	*75I/11*
GERY	*1-12*	*75I/7*	*MIKE*	*1-5*	*75P/2*	*CHARLY*	*1-20*	*75I/14*

PNC Exploration (Canada) Ltd. claims

CROFT	*1-29*	*75I/1*
CROFT	*30-35*	*75H/16*
MARY	*1-6*	*65L/5*
DUB	*1-6*	*65M/2*

Hudson Bay Oil and Gas Ltd. claims:

LEM	*1-13*	*75I/10*	*MING*	*1-11*	*75I/15*	*MON*	*1-11*	*75I/10*
SNO	*1-5*	*75I/10*	*AN*	*1-3*	*75I/15*	*NIT*	*1-5*	*75I/10*

Gulf Minerals Canada Ltd. claims:

OX	*1-20*	*75P/1*

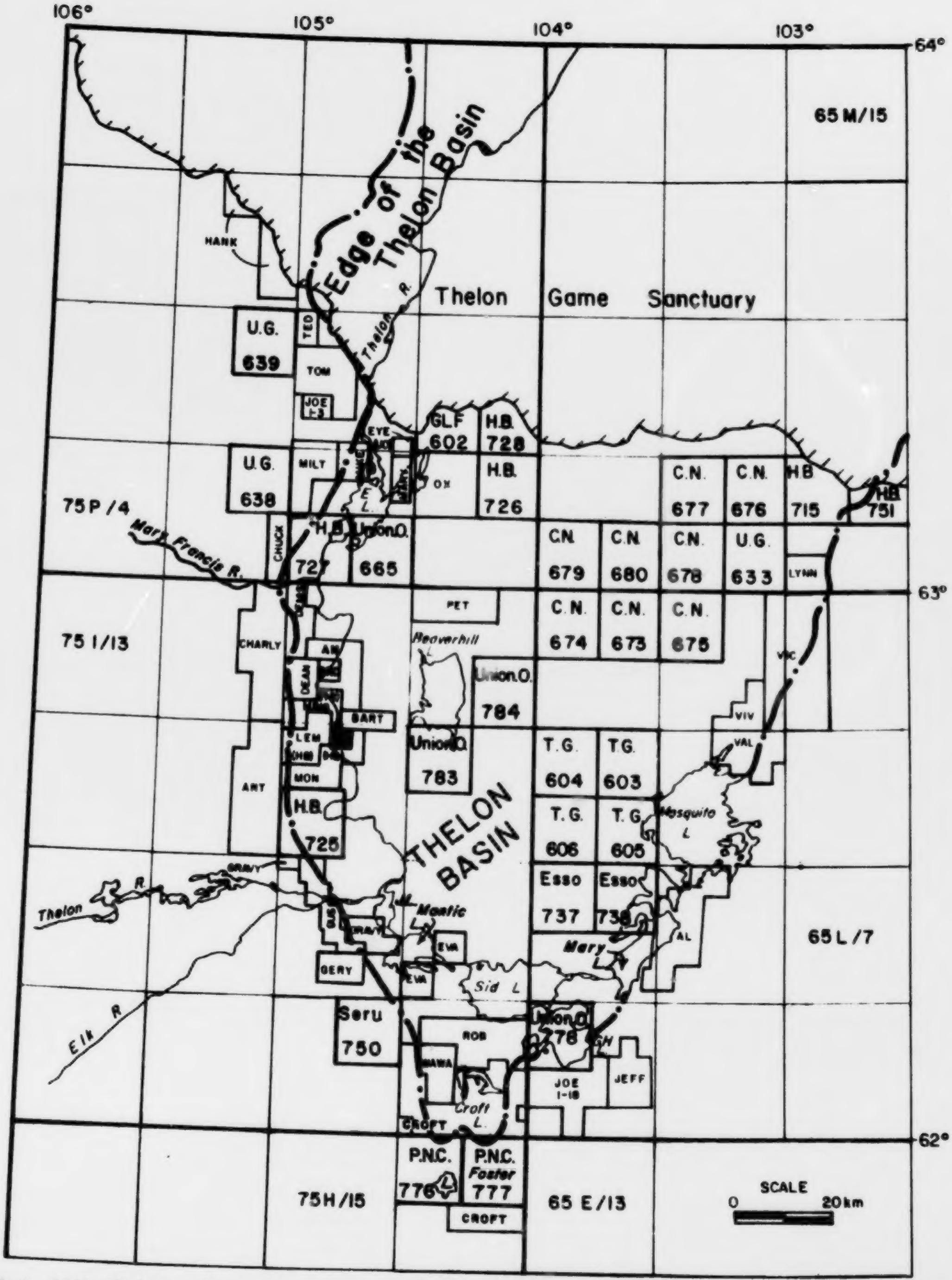
106°
105°
104°
103°
64°
63°
62°
65 M/15
Edge of the Thelon Basin
Thelon R.
Thelon Game Sanctuary
HANK
U.G. 639
TED
TOM
JOE 1-3
EYE
GLF 602
H.B. 728
H.B. 726
OX
U.G. 638
MILT
75P/4
Mary Francis R.
CHUCK
H.B. 727
Union O. 665
C.N. 677
C.N. 676
H.B 715
H.B 751
C.N. 679
C.N. 680
C.N. 678
U.G. 633
LYNN
PET
Beaverhill L.
CHARLY
75 I/13
AN
DEAN
C.N. 674
C.N. 673
C.N. 675
VIC
Union O. 784
BART
VIV
LEM
Union O. 783
T.G. 604
T.G. 603
VAL
MON
ART
H.B. 725
THELON BASIN
T.G. 606
T.G. 605
Mosquito L.
Esso 737
Esso 738
Thelon R
Mary L.
AL
65L/7
GUS
EVA
GERY
Sid L
Elk R
Seru 750
ROB
Union O. 778
GH
WAWA
JOE 1-18
JEFF
Croft L.
CROFT
P.N.C. 776
P.N.C. Foster 777
75H/15
65 E/13
SCALE
0
20km

FIGURE 6-3: 1981 Claims and permits - Western Thelon Plain. JL - Jim Lake, GHL - Gravel Hill Lake, UG - Urangesellschaft Canada Ltd., HB - Hudson Bay Oil and Gas Ltd., GLF - Gulf, TG - Texasgulf Inc., CN - Canadian Nickel Co. Ltd., SO - Esso Resources Canada Ltd., Union O - Union Oil Co. Ltd.

Urangesellschaft Canada Ltd. claims:

WAWA 1-12	75I/1	JOE 1-3	75P/7	MILT 1-10	75P/2	ART 1-25	75I/11
BART 1-8	75I/10,15	LYNN 2-6	65M/2	ROB 1-23	75I/1	CHARLY 1-20	75I/14
DEAN 1-6	75I/15	TOM 1-14	75P/7	GUS 1-10	75I/7	PET 1-12	75I/16
DENIS 1-7	75I/15	MARY 1-4	75P/2	AL 1-22	65L/6	EVA 10-17	75I/8
GERY 1-12	75I/7	MIKE 1-5	75P/2	JOE 1-18	75I/10	CHUCK 1-6	75P/3
HANK 1-14	75P/11	VIC	65L/15	VIV	65L/14	VAL	65L/11

Hudson Bay Oil and Gas Ltd. claims:

LEM 1-13	75I/10	MING 1-11	75I/15	MON 1-11	75I/10	AN 1-3	75I/15	SNO 1-5	75I/15

Gulf Minerals Canada Ltd. claims:

OX 1-20	75P/1

Union Oil Co. Ltd. claims:

EYE 1-14	75P/7

PNC Exploration (Canada) Ltd. claims:

CROFT 1-36	75 H/15, I/1

DUBAWNT BASIN PROJECT

GRAVY 7, GUS 2-8 Uranium
Urangesellschaft Canada Ltd. 75 I/7
#3100, 2 Bloor St. E. 62°25'N,104°50'W
Toronto, Ont., M4W 1A8

REFERENCES

Gibbins (1984); Miller (1983).
DIAND assessment report 081593.

PROPERTY

GRAVY 7, GUS 2-8

LOCATION

The claims follow the southwestern boundary of the Thelon Basin, centred on the junction of the Thelon and Elk Rivers about 20 km west-northwest of Mantic Lake (Fig. 6-2). The adjoining GERY claims lie south of the GUS claims and west of Mantic Lake.

HISTORY

The GUS claims were staked in 1979 to cover the Thelon Formation-basement unconformity in an area where a 1978 airborne VLF-magnetic survey indicated conductors and possible metasedimentary basement rock. The adjoining GRAVY claims were staked in 1980. NTS area 75 I/7 had previously been held by Urangesellschaft Canada Ltd. as Prospecting Permit 380 (1976 to 1978) and by Houston Oils Ltd. and Trudel Minerals Ltd. as Prospecting Permit 115 (1969 to 1971).

In June,1981 Questor Surveys Ltd. was contracted to fly some 244 line-km of Input EM and magnetometer surveys over the GUS claims. Only a few weak Input anomalies were found and these were attributed to conductive overburden. Also in 1981, the Gusto grid (41 km of line) was established at the junction of a VLF anomaly and the sub-Thelon Formation unconformity (GUS 6 and 7). VLF-EM 16, magnetic and soil surveys were done in the grid area. A moderately strong VLF anomaly, corresponding to the airborne-detected anomaly, follows a pronounced magnetic low within an area of strong magnetic relief. Most of the 448 soil samples contain less than 0.2 ppm uranium and do not reveal any anomalous trends or clusters (Gibbins, 1984).

DESCRIPTION

The claims cover the Thelon Formation-basement unconformity where the 1978 airborne geophysical surveys show a prominent northeast-trending magnetic high, possibly a strongly magnetic mafic gneiss, and several moderately strong VLF conductors. Basement gneisses and, less commonly, massive granites were mapped. The only Thelon sandstone encountered were a few frost-heaved boulders on GUS 6.

The Lone Tree grid area (GUS 8, 62°20'N, 104°45'W) covers the contact between gneisses and dioritic instrusives. The spatial relationship of the two rock types in outcrop indicates a gradational boundary between the gneisses and dioritic intrusions. The Junction Lake grid (62°28'N, 104°48'W) covers parts of GRAVY 7 and GUS 2, 4-6 claims.

CURRENT WORK AND RESULTS

1982

Two separate projects were undertaken on the GUS and GRAVY claims in 1982. Semi-reconnaissance soil sampling, mapping and scintillometer surveying (prospecting) were completed in the 'Junction Lake' area, while detailed mapping, soil sampling, ground VLF, magnetometer and Max-Min surveys tested the Lone Tree grid on GUS 8.

A single highly radioactive boulder was found in the northeast corner of the 'Junction Lake' subarea. It consisted of hematized sandstones, containing 700 ppm uranium, 20.8 % CaO and 14.2% P_2O_5, characteristic of uranium-rich apatite from other areas of the Thelon Basin (Miller, 1983). The analytical results of 323 soil samples demonstrated a very low uranium background in the Junction Lake area. The average was 1.2 ppm U_3O_8, with a range of 0.1 to 19.1 ppm. A weak northeasterly trend of higher results seems to be related to a similar trend in underlying gneisses.

A total of 36.9 line km of grid was established on the Lone Tree grid. Approximately 99% of the area is overlain by muskeg, glaciofluvial and glaciolacustrine overburden. Limited outcroppings and statistical analysis of boulders indicate the presence of Thelon sandstone on the northeast end of the grid.

A total of 720 soil samples show a very low uranium background (average 1.2 ppm U_3O_8, range of 0.1 to 15.3 ppm and threshold of 4.0 ppm). Approximately 90 percent of the soil samples with uranium assays greater than threshold are in the northeast part of the grid, adjacent to the Aphebian-Archean/Helikian unconformity as indicated by VLF and boulder data.

Ground geophysical follow-up over a major airborne VLF conductor suggests its source is a near-surface fault with little or no graphite, approximately at the sub-Thelon Formation unconformity.

THELON WEST PROJECT
LEM, MON, MING, AN, SNO AND NIT CLAIMS

Urangesellschaft Canada Ltd.	Uranium
Hudson's Bay Oil and Gas Co. Ltd. (now Dome Petroleum Ltd.)	75 I/10,15
Alberta Energy Co. Ltd.	62°40'N,104°8'W

REFERENCES

Gibbins (1983b, 1984); Laporte (1979); Padgham and others (1978); Wright (1967).

DIAND assessment reports: 081615 (Boomerang grid - 1982); 081568 (Disco Grid - 1982); 081736 (Boomerang and Disco grids - 1983).

PROPERTY

LEM 1-13, MING 1-11, MON 1-11, AN 1-7, SNO 1-5 and NIT 1-6.

LOCATION

The claims are near the western margin of the Thelon Basin, about 20 km west of the southwest corner of Beaverhill Lake (Figs. 6-2, 6-4). Yellowknife lies 500 km to the west of the claims.

The Disco grid is in the MING 4,5,8-9 claim area (62°46'N, 104°55'N - 75 I/15) and extends northward into the adjacent DEAN claims. The Boomerang grid (62°41'N, 104°2'W - 75 I/10) was extended in 1982 southwestward to include parts of the LEM 1-3, 5 and 11 and MON 1 and 2 claims (Fig. 6-4) and reach the northeast boundary of the Elk River grid on the ART claims (75 I/11).

HISTORY

In 1969 United Bata Resources Ltd. held mineral rights in the area as Prospecting Permit 174 and conducted airborne radiometric and photogeological surveys as well as ground checks of airborne anomalies (Padgham and others, 1978).

In 1976 Urangesellschaft Canada Ltd. acquired 10 permits, including Prospecting Permits 381 (75 I/10) and 382 (75 I/15). They did radiometric and lake-sediment surveys of this and adjacent permit areas from 1976 to 1978 (Laporte, 1979, p. 44). Prospecting Permits 381 and 382 expired in March,1979. In June 1979, Hudson Bay Oil and Gas Co. Ltd. staked the LEM claims. The adjacent MING and MON claims were added in December, 1979, the AN claims in June,1980 and the SNO claims in July,1981. The NIT claims were recorded in October,1982 by Urangesellschaft Canada Ltd. They cover the northwest corner of what was Prospecting Permit 725 (see Gibbins,1984, p. 122).

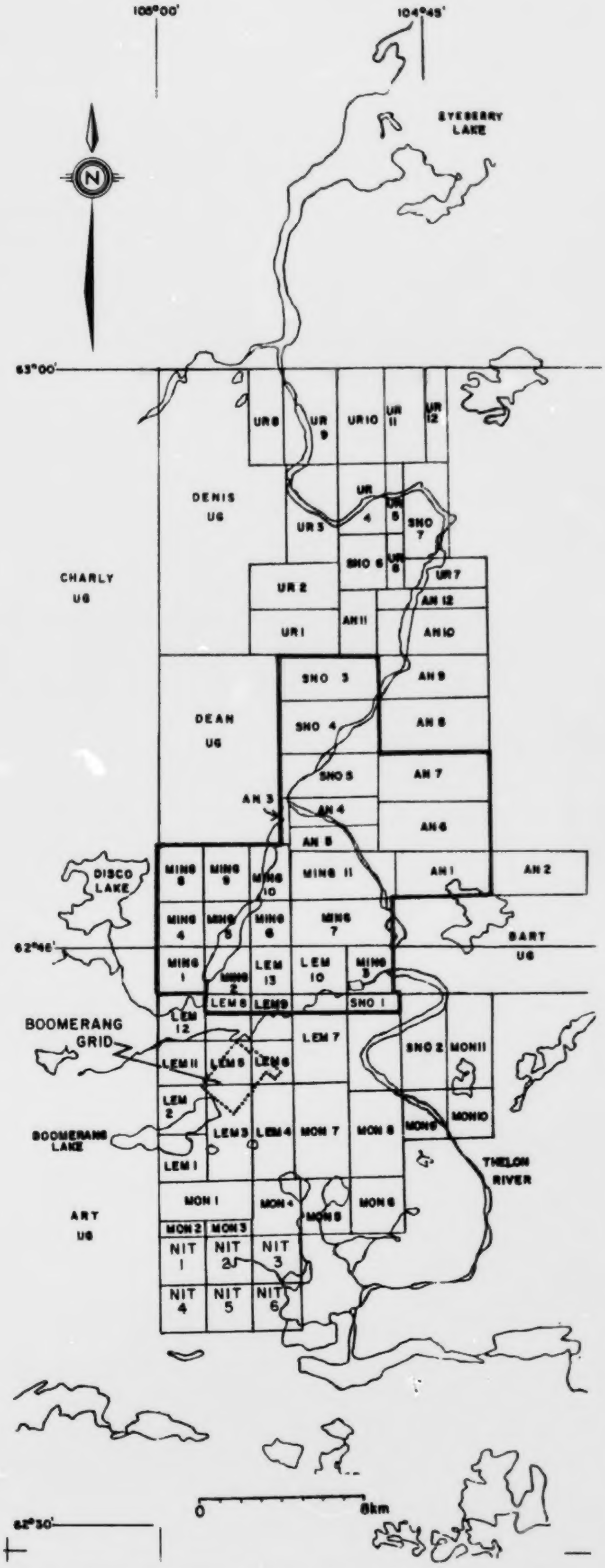
105°00'
104°45'
EYEBERRY LAKE
63°00'
UR 8
UR 9
UR 10
UR 11
UR 12
DENIS UG
UR 3
UR 4
UR 5
SNO 7
CHARLY UG
SNO 6
UR 6
UR 7
UR 2
AN 12
UR 1
AN 11
AN 10
SNO 3
AN 9
SNO 4
AN 8
DEAN UG
SNO 5
AN 7
AN 3
AN 4
AN 5
AN 6
DISCO LAKE
MING 8
MING 9
MING 10
MING 11
AN 1
AN 2
MING 4
MING 5
MING 6
MING 7
62°45'
BART UG
MING 1
MING 2
LEM 13
LEM 10
MING 3
LEM 8
LEM 9
SNO 1
BOOMERANG GRID
LEM 12
LEM 7
LEM 11
LEM 5
LEM 6
SNO 2
MON 11
LEM 2
MON 9
MON 10
BOOMERANG LAKE
LEM 3
LEM 4
MON 7
MON 8
THELON RIVER
LEM 1
MON 1
MON 4
MON 5
MON 6
ART UG
MON 2
MON 3
NIT 1
NIT 2
NIT 3
NIT 4
NIT 5
NIT 6
0
8km
62°30'

FIGURE 6-4: Boomerang Lake claims of the Thelon West project.

In June of 1979, Hudson's Bay Oil and Gas contracted Questor Surveys Ltd. of Mississauga, Ontario to fly approximately 2600 line-km of electromagnetics and magnetics using their INPUT system. One conductive zone, referred to as Zone 7A, was identified as being due to a bedrock source and the LEM 1-13 claims were staked to cover this zone and its possible extensions. This zone trends northeast, and lies northeast of Boomerang Lake (Fig. 6-5).

A limited ground geophysical program was undertaken in July, 1979 to verify and accurately locate the INPUT-EM conductors (Gibbins, 1983b).

In 1980-81, the Hudson's Bay Oil and Gas Ltd. in house data-acquisition system (radiometrics and VLF-EM) was flown over 400 line-km of the claims. This work did not detect significant radioactivity, however, numerous VLF conductors were recorded.

Elfast Turam EM work in the spring of 1980 confirmed two parallel conductive zones northeast of Boomerang Lake (Fig. 6-5). They are at least 6 km long and at a depth of about 100 m. A concurrent gravity survey (1076 stations) showed a possible step fault in the conductive zone. Additional Turam work in 1981 failed to indicate any significant bedrock conductors in the MON claims, but did succeed in outlining a previously undiscovered conductive zone on MING 9 and further extended and delineated a major conductive zone cross-cutting the LEM claim area (Gibbins, 1984).

In April-May, 1980, five percussion holes (663 m) were completed along the conductive zone. Three of these holes reached graphitic basement.

Some 300 frost-boil samples were collected from permits and claims, but no significant results were obtained.

Questor Surveys Ltd. was contracted to fly 615 line-km of INPUT survey over the parts of the claim and permit areas not flown in 1979. This survey outlined numerous isolated conductors that are interpreted to be of surficial origin and defined a westerly trending strike extension of the bedrock conductor on the LEM claims and also confirmed the presence of a small bedrock conductor on MING 9.

DESCRIPTION

The LEM claims straddle the western margin of the Thelon Basin (Wright, 1967). This margin is defined by the sub-Dubawnt Group unconformity with flat-lying unmetamorphosed sandstones of the Thelon Formation to the east and underlying Aphebian basement to the west. The Hudsonian Orogeny has developed a generally northeasterly foliation in these basement rocks. The Aphebian basement is mainly granite and granitic gneisses with smaller areas of metapelites and gneisses. However, the LEM claims contain the northeasternmost exposure and subsurface continuation of the Elk River Gneiss Belt (Fig. 6-1), which is composed of paragneiss with numerous graphitic zones.

CURRENT WORK AND RESULTS

Boomerang Grid

1982:

A major portion of the Boomerang Lake Grid was established by Urangesellschaft staff early in the season. Lines 86W to 16W represent the new gridded area and lines 15W to 22E were re-established.

An extensive geophysical and geochemical program was completed on the Boomerang Lake Grid during the summer of 1982 in order to define drill targets for testing in 1983. Table 6-2 summarizes all the surveys completed.

The systematic sampling of A_0 organic material delineated several sample clusters anomalous in U_3O_8, including a broad anomalous zone which parallels the 12+00S baseline between 66W and 80W and is closely associated with a major EM conductor. The B_1 soil samples analysed for Polonium 210 revealed a large anomalous cluster in the area of 14+00S and

TABLE 6-2: GEOPHYSICAL AND GEOCHEMICAL WORK COMPLETED ON THE BOOMERANG GRID - 1982

Gridding Boomerang Lake Grid	147.1	line km
Re-Gridding Boomerang Lake Grid	59.3	line km
A_0 Soil Sampling	693	samples
B_1 Soil Sampling	568	samples
Polonium-210	568	samples
Track Etch	1095	cups
Scintillometer Survey	93.1	line km
Max-Min II - 150 m coil separation*	74.3	line km
Max-Min II - 250 m coil separation*	56.8	line km
VLF (Geonics), Seattle, Washington	197.4	line km
VLF (Geonics), Annapolis, Maryland	21.7	line km
Turam (ELFAST) - 50 m coil separation (25, 75, 225, 675 and 2025 Hz)	2.0	line km
Magnetics (EDA Omnimag System)	206.4	line km
Gravity (LaCoste and Romberg)	133.2	line km
Resistivity (Geonics EM-16R)	1.1	line km

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* (3555 and 888 Hz)

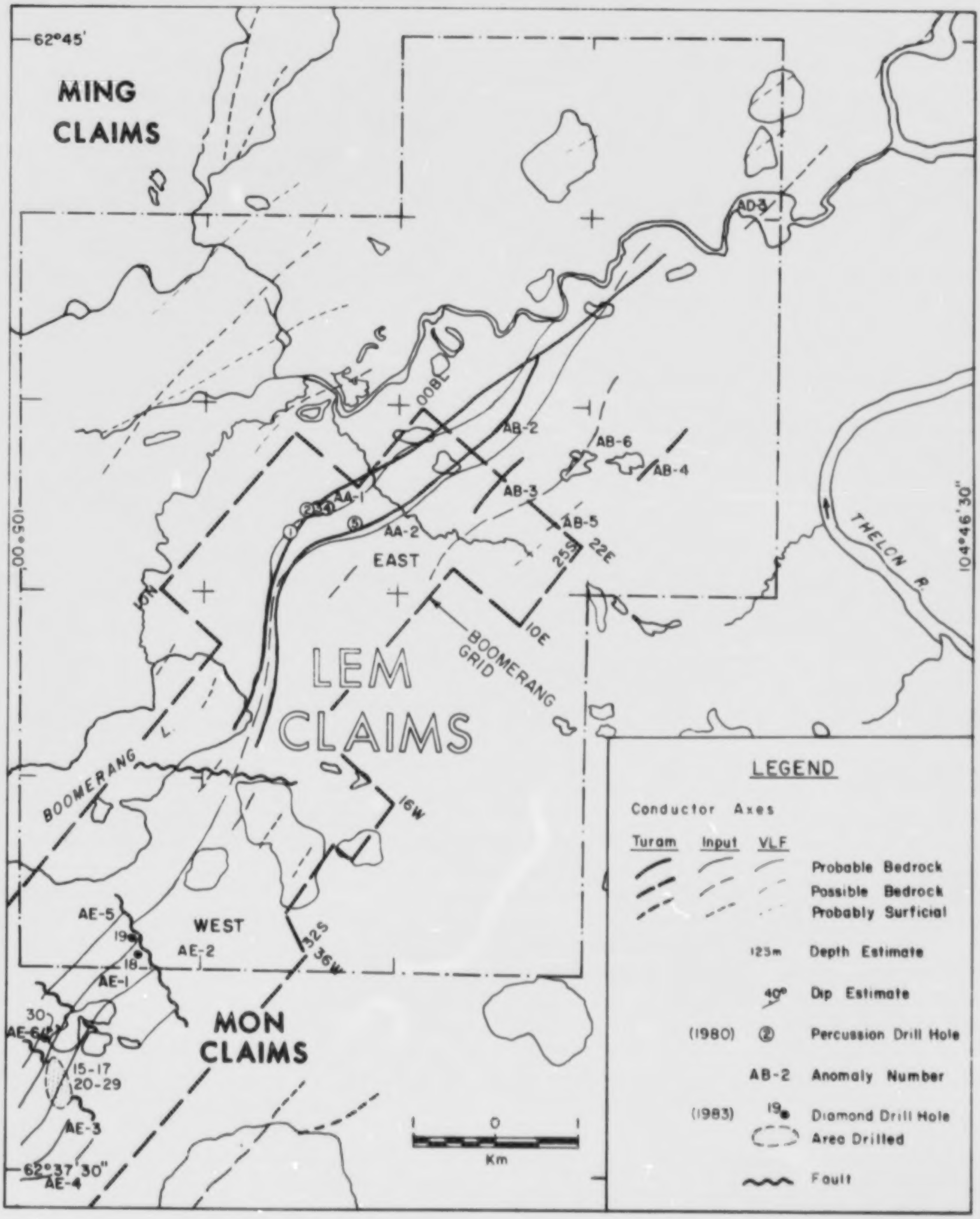

62°45'
MING CLAIMS
AD-3
00BL
AB-2
AB-6
AB-4
AB-3
AB-5
AA-1
AA-2
① ② ③ ④ ⑤
EAST
25S
22E
10E
10N
BOOMERANG GRID
105°00'
104°46'30"
THELON R.
LEM CLAIMS
BOOMERANG
16W
AE-5
WEST
19
18
AE-2
AE-1
32S
36W
30
AE-6
15-17
20-29
AE-3
62°37'30"
AE-4
MON CLAIMS
0
Km
LEGEND
Conductor Axes
Turam
Input
VLF
Probable Bedrock
Possible Bedrock
Probably Surficial
125m Depth Estimate
40° Dip Estimate
(1980) ② Percussion Drill Hole
AB-2 Anomaly Number
(1983) 19 Diamond Drill Hole
Area Drilled
Fault

FIGURE 6-5: EM conductors and drill holes, LEM and MON claims, Boomerang Grid

56+00W that is relatively close to a weakly anomalous zone of radioactivity. The Track Etch survey did not delineate any outstanding anomalous zones, but indicated that there is a relatively high radon background present at the Boomerang Lake grid.

The electromagnetic surveys completed on the Boomerang Lake grid outlined several good conductors. Their number diminishes from 5 in the southwest portion of the grid to 2 in the northeast. Depth calculations estimated from the HLEM and magnetic data suggest that these conductors vary in depth from 60 to 90 m from west to east respectively. The conductors are very well defined in the western half of the grid, but to the east of 32+00W their presence has not been defined.

The magnetic survey outlined several anomalies oriented both parallel and orthogonal to the strike of the conductors in the area. Depth-to-basement calculations indicate that a cover of 100 to 125 m is fairly uniform across the grid. Three subtle gravity lows were detected on the west half of the grid. The lows could be caused by changes in bedrock lithology, changes in Thelon Formation sandstone or overburden thickness or possibly by alteration. The lows occur on conductors and/or at the intersections of faults.

1983: (from DIAND assessment report 081736.)

Twenty-two holes totalling 2084 m were drilled on the Boomerang Lake grid in 1983 (Fig. 6-5). Steeply dipping semi-pelitic metasediments and intercalated graphitic gneisses unconformably overlain by up to 45 m of flat-lying Thelon sandstone were intersected. This drill program was successful in delineating strongly altered sandstone overlying minor uranium concentrations in association with significant precious metal concentrations near the unconformity in holes BL-83-17 and 21.

Close association of uranium with the unconformity and with strongly altered sandstone indicates that processes, such as those that created the large high-grade deposits in Saskatchewan and Australia, have been active in the Thelon West joint venture area. This is important because it represents the first documentation of unconformity-type uranium concentrations in the upper Thelon basin area. The best intersections in holes 17 and 21 are given below:

BL-83-17 103.8 - 106.3 m (2.5 m) 2.89 oz/ton Ag and 0.026% U_3O_8.

BL-83-21 98.7 - 100.7 m (2.0 m) 0.265 oz/ton Au and 0.136% U_3O_8. of which 0.5 m yielded 0.66 oz/ton Au and 0.500% U_3O_8.

The results from the Track Etch cups that were retrieved during the 1983 field season indicate the presence of four moderately anomalous zones. One of these zones appears to be closely related to the zone intersected in hole BL-83-21.

The Turam survey indicated that the conductors are continuous in the central portion of the Boomerang Lake grid. No further information was gained by the brief resistivity survey.

A careful review of data available has been recommended so that criteria for the identification of good drill targets can be established and applied.

Disco Grid (MING 4, 5, 8-10)

1982:

The Disco Lake grid, consisting of 57.4 km of line with 200 m spacing, was established with a base line trending Az 40° parallel to Input EM anomalies found in 1979.

Analyses of several hundred soil samples from the A_0 horizon delineated a few clusters of anomalous uranium concentrations, (i.e., 4 to 11 ppm U_3O_8). A scintillometer survey done at the same time resulted in average readings of 45 cps, with a few readings up to 80 cps (Urtec UG-135 spectrometers).

The magnetic survey revealed a relatively homogenous regional pattern. A highly magnetic anomaly on the northern boundary of the grid is believed to be related to ultramafic rocks. A weak but distinct magnetic low in the eastern portion of the grid may be related to Thelon sandstone and corresponds to a gravity high, an EM conductor and anomalous A_0 soil samples. Another subtle gravity anomaly exists on the east side of the strongest EM anomaly.

A detailed Max-Min (HLEM) survey delineated two subtle northeast-trending electromagnetic conductors. Both anomalies have very little out-of-phase response and are believed to be non - graphitic; probably due to wet clay in fault zones. The conductors were also outlined by a turam survey; and VLF lines failed to identify conductors perpendicular to the northeast trend.

1983:

No work was done on the Disco Grid in 1983.

DUBAWNT BASIN PROJECT

ART 1-25: ELK RIVER & SAHARA GRID Uranium
Urangesellschaft Canada Ltd. 75 I/11
62°38'N,105°06'W

REFERENCES

Gibbins (1984).

DIAND assessment reports: 081614 (1982) and 081714 (1983).

PROPERTY

ART 6-9, 18-19	Elk River Grid	62°36'N,105°04'W
ART 20-22	Sahara Grid	62°33'N,105°08'W

LOCATION

The ART claims are directly west of the western trace of the Thelon Formation-basement unconformity, which approximates 105°W longitude, and 10 to 20 km east of Breithaupt Lake. This area is about 5 to 30 km north of the Thelon River (Fig. 6-2).

HISTORY

Prospecting Permit 459 was granted to Urangesellschaft Canada Ltd. in 1977.

In 1977 lake-water and lake-sediment geochemical surveys were done, but no significant uranium or radon concentrations were recorded. However, detailed mapping and petrographic studies in the eastern half of the permit area delineated a northeasterly trending metasedimentary-metavolcanic belt.

In 1978 airborne geophysical surveys indicated very strong, northeast-trending VLF conductors in the metasedimentary belt and prompted the staking of the ART claims in 1979 before the permit lapsed.

Early in 1980 the Elk River grid was established on the ART 6-9, 18 and 19 claims in the center of the claim group between latitudes 62°35' and 62°39'N. Most of the subsequent work has been done on this grid as it contains the favourable belt of metavolcanic-metasedimentary rocks and the VLF conductors. The eastern boundary of the grid adjoins the LEM and MON claims (Figs. 6-2, 6-6). The Elk River grid was the focus for a variety of geochemical

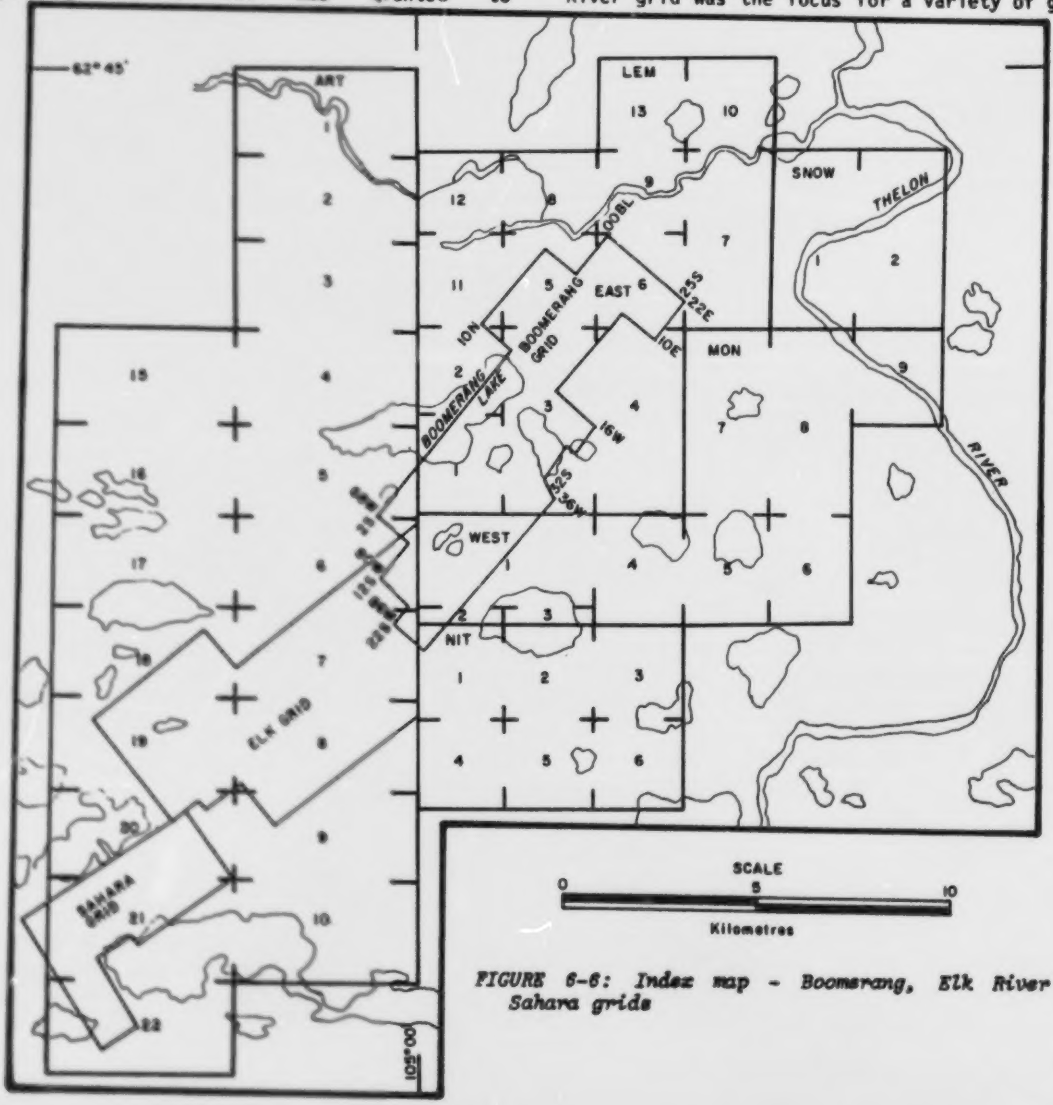


FIGURE 6-6: Index map - Boomerang, Elk River and Sahara grids

and geophysical surveys completed during the 1980 and 1981 field seasons (Gibbins, 1984, p. 214). An airborne Input survey was flown over the entire area in 1981.

DESCRIPTION

The ART claims are underlain by a northeasterly trending belt of metavolcanics, metasedimentary and granitic gneisses of Aphebian to Archean age: the Elk River Gneiss Belt (Fig. 6-1). These gneisses are generally steeply dipping with stringers and lenses of granitic intrusive or migmatitic material. To the east, unconformably overlying the gneissic basement sequence, is the flat-lying, Paleohelikian, Thelon Formation sandstone of the Dubawnt group.

Glacially-derived overburden covers more than 90% of the claim area, with muskeg drumlins, eskers, and beach ridges forming topographic highs.

CURRENT WORK AND RESULTS

Elk River Grid

1982:

Prospecting teams explored the area underlain by northeast-trending HEM conductors, but failed to find outcrop or boulders of graphitic schists or gneiss. The large number of sandstone boulders found in the area supports the idea of a southwestward extension of the Thelon sandstone along the major HEM conductors.

A Track Etch survey (450 cups at 50 m intervals along lines spaced 100 m apart) showed good clustering of anomalous radon samples closely associated with a broad gravity low and two strong HEM conductors. A good correlation exists between the Track Etch radon anomalies, and helium and uranium in soil anomalies in the target area.

Pulps from 312 B horizon soil samples collected in 1981 were analysed for Polonium 210 and loss-on-ignition by Monenco Analytical Laboratories. Polonium-uranium activity ratios (Po:0.33U) were calculated and contoured.

Geophysical work in 1982 included 45 km of VLF-EM, 25.7 km of gravity and 66 km of magnetic surveys. Results from the VLF survey indicate poorly conductive, structural features suggestive of faulting.

The ground magnetometer survey in the western portion of the grid demonstrates magnetic banding similar to that found on the eastern portion in 1981. The banding is caused by the high magnetic susceptibility of some of the metasedimentary felsic gneisses as compared with the relatively low susceptibility of graphitic schists.

The contoured Bouger gravity data indicates two gravity lows. They may represent alteration zones.

1983:

Fourteen holes totalling 1345 m were drilled on the Elk River grid (ART 6 and 7) during 1983. Moderately to strongly chloritized altered zones related to shearing and brecciation were delineated in a series of steeply dipping, semi-pelitic metasediments, but no significant uranium concentrations were defined. Several holes intersected graphitic gneisses, which appear to be the cause of the conductors.

The 1983 gravity and the Track Etch surveys did not yield any significant anomalies worthy of immediate follow-up.

The tremendous overburden thicknesses encountered in the 1983 drilling downgrade the importance of many of the anomalies previously thought to be important. Most of the gravity lows appear to be caused by increased overburden depths, and the presence of at least 35 m of frozen sand deposited by post-glacial lacustrine and fluvial processes would strongly suppress any geochemical anomalies.

One of the more significant results of the 1983 drill program was the fact that no substantial thicknesses of sandstone were intersected. However, it is felt that the overburden-basement interface is very close to the unconformity for the following reasons:

i. Sandstone that is thought to represent bedrock was intersected over widths of up to one metre in holes ER-83-1 and 5.

ii. A 60 cm dyke containing sandstone that was intersected in hole ER-83-1 probably represents a sandstone-filled fracture close to the unconformity.

iii. Strong paleo-weathering as expressed by textural and mineral destruction of lithologies at the top of the basement followed by a decreasing degree of hematization downhole is present in most of the drill holes.

A major shear zone within a 9-m-thick section of strongly altered biotite gneiss with associated anomalous boron concentrations was noted in hole ER-83-3. In addition, several narrower brecciated and sheared zones with accompanying weak to moderate alteration are present in several other drill holes. However, none of these zones contain significant uranium concentrations.

Only a small portion of the conductors on the Elk River grid have been tested, but future drill target delineation will be difficult because of the heavy overburden cover.

Sahara Grid

1982:

The Sahara grid consists of some 95 km of grid established southwest of the Elk River grid in 1982 to follow up conductors identified from airborne geophysics and to trace the extension of the Elk River grid conductor system. Geochemical, magnetometer, VLF and HLEM (Apex Max-Min) surveys were done.

A total of 643 soil samples were taken from the organic A_0 layer in the southwestern portion of the grid where significant soil has developed. Results indicate a low uranium background (maximum 7.4 ppm U_3O_8). No significant clustering of anomalous samples is evident, but several spot anomalies show a linear trend. The northern portion of the grid is covered with sand of a reworked esker-beach complex and little or no soil development.

The airborne-detected EM conductors in the southwestern portion of the Sahara grid were confirmed by ground geophysical surveys. These conductors appear to be a laterally displaced extension of the Elk River conductors. Max-Min surveys, using various cable lengths, indicate that the conductors end abruptly rather than becoming deeper. A north-trending regional magnetic low is believed to represent a fault that displaced the strong EM conductors north of the Sahara grid.

DUBAWNT BASIN PROJECT

CHARLY 6-8 Uranium
Urangesellschaft Canada Ltd. 75 I/14
62°50'N,105°W

REFERENCES

Gibbins (1984); Wright (1967).
DIAND assessment report 081572.

PROPERTY

CHARLY 6-8.

LOCATION

The CHARLY claims are near the western boundary of the Thelon Basin, some 25 km west of Beaverhill Lake and 540 km east of Yellowknife (Fig. 6-2).

HISTORY

The claims are in NTS area 75 I/14, formerly permitted to Urangesellschaft as permit 460 from 1977-1979. The claims were staked in 1979. Geological mapping in 1978 outlined a small belt of pelitic metasediments. Considerable geophysical and geochemical work was done on the CHARLY claims in 1980 and 1981 (Gibbins, 1984).

DESCRIPTION

Most of CHARLY 6 and the northwest corner of CHARLY 7 (Olson Lake area) are underlain by a northeast-trending belt of feldspar-biotite-gneiss, believed to represent pelitic metasediments related to the Elk River Gneiss Belt. The belt is normally marked by a major aeromagnetic low, but the 'Olson Lake' area (CHARLY 6-8) is characterized by much higher magnetic relief.

CURRENT WORK AND RESULTS

1982:

A two-man crew did geologic mapping, soil sampling and scintillometer surveys over the Olson Lake grid (CHARLY 6). A total of 161 soil samples from the A_0 horizon were analysed for uranium by delayed neutron counting. Most of the anomalous soils can be related to nearby outcrops of slightly radioactive granites and gneisses. Small discontinuous pods of sedimentary rocks are present but most of the rocks are intrusive.

DUBAWNT BASIN PROJECT

DEAN 1-6 Uranium
Urangesellschaft Canada Ltd. 75 I/15
62°50'N,105°W

REFERENCES

Gibbins (1984).
DIAND assessment report: 081549.

PROPERTY

DEAN 1-6.

LOCATION

The DEAN claims are 25 km west of Beaverhill Lake, on the sandstone side of the western edge of the Thelon Basin. They are adjoined by the MING claims to the south, CHARLY claims to the west and DENIS claims to the north (Fig. 6-2).

HISTORY

The area was covered by reconnaissance lake geochemistry in 1976 and 1977 (Prospecting Permit 382). In 1978 airborne geophysics and overburden geochemistry covered the area. The claims were staked in the autumn of 1978 to cover six first-order anomalies.

In 1979, a grid was established and used as a base for magnetometer, radiometric, VLF-EM, Max-Min II, gravity, resistivity, overburden drilling and prospecting surveys. Up to 400 m of sandstone masked much of the magnetic and some of the VLF-EM responses. Airborne surveys were similarly affected, nevertheless, several conductors of possible bedrock origin and two second-order radiometric anomalies were identified.

The 1981 field program consisted of 20 line-km of Turam EM on the northeastern end of the Disco grid (DEAN 5 and 6), geological reconnaissance, an 80-site soil geochemistry survey on DEAN 3 and 4, and a Questor Survey Ltd. Mark IV Input and magnetometer survey (Gibbins, 1984).

DESCRIPTION

Due to a paucity of outcrops, the Helikian-Archean unconformity has not been accurately delineated, but is believed to follow approximately the western margin of the DEAN claim block. Overburden is thick, particularly in the southern part of the DEAN group where no outcrops were found. In the northern part of the DEAN group, one outcrop of coarse-grained, buff to white, horizontally bedded sandstone was found. The overburden may be thinner on the DENNIS group to the north, where several sandstone outcrops and areas of frost-heaved boulders were identified.

CURRENT WORK AND RESULTS

1982:

Detailed ground geophysical surveys completed on the southeast portion of the DEAN claims delineated a body of very high magnetic susceptibility. It probably represents a small ultramafic intrusion into the Archean/Aphebian basement assemblage. As such, it is not significant insofar as uranium mineralization is concerned.

Less distinct features include a gravity low and a weak EM conductor which flank the east side of the magnetic anomaly. Although the conductor does not appear to have a graphitic source, the evidence accumulated to date indicates that there may have been substantial alteration and cross-faulting of the unconformity.

DUBAWNT BASIN PROJECT
TOM 1-8, 10-15:
BOULDER CREEK GRID Uranium
Urangesellschaft Canada Ltd. 75 P/7
$63^{o}25'N, 104^{o}50'W$

REFERENCES

Gibbins (1983b, 1984).
DIAND assessment report 081584.

PROPERTY

TOM 1-8, 10-15

LOCATION

The TOM claims are 10 to 20 km north of Eyeberry Lake. They are bounded by the Thelon River, the Thelon Game Sanctuary and the western edge of the Thelon Basin on the northeast and JOE 1-3 claims on the southwest (Fig. 6-2). The area is 650 km east of Yellowknife.

HISTORY

Anomalous radon concentrations were detected in lake sediments on Prospecting Permit 384 in 1976 and 1977. In 1978, ground and airborne geophysics, overburden geochemistry, mapping and two short Winkie drill holes resulted in the discoveries of 'Don's Showing' (JOE 3) and 'John's Showing' (TOM 14). The TOM and JOE claims were recorded in October of 1978.

In 1979 geological mapping and prospecting led to the discovery of radioactivity on the TOM 7 claim. Three grids were established and extensive prospecting and geophysical surveys were carried out in order to evaluate airborne-detected VLF anomalies that were close to two small uranium showings consisting of narrow pitchblende veinlets. A total of 95 line-km of VLF-EM survey was completed on the Thelon grid to test an airborne-detected VLF conductor within a magnetic low (Gibbins, 1983b).

Overburden geochemical sampling and some geophysical test lines were done over the Thelon grid in 1980. In 1981 gravity and resistivity surveys were carried out on the Thelon grid as well as more overburden geochemical sampling. Prospecting in the TOM 7 and 8 claim areas uncovered some weak radioactivity in strongly altered basement rocks which are very similar in texture and appearance to a regolith (Gibbins, 1984).

DESCRIPTION

The TOM and adjacent JOE claim groups are mainly underlain by a northward-trending sequence of metasedimentary gneisses interspersed with narrow cataclastic (mylonite) zones. The gneisses are mostly uniform, migmatized, felsic and interpreted to be metamorphosed to upper-amphibolite facies. K-feldspar and quartz are remobilized in coarse "sweats" parallelling schistosity, and porphyroblasts are common. A large body of massive, coarse-grained granodiorite lies to the west of the gneiss.

Major shears defined by linear cataclastic zones occur at several localities within the basement complex. These rocks are mylonitic, fine-grained, and strongly hematized. Uranium minerals were found along narrow fracture zones in strongly hematized gneisses at two showings (DON and JOHN showings) (Gibbins, 1984).

CURRENT WORK AND RESULTS

1982:

The Boulder Creek grid was established on the TOM 7 and 8 claims to evaluate a uranium showing in strongly altered basement material discovered during prospecting in 1981. Geological mapping, ground magnetometer, VLF, Max-Min II and soil sample surveys were carried out over the grid.

An electromagnetic anomaly of poor conductivity was delineated by both the VLF and HLEM surveys. A distinct magnetic low correlates perfectly with this weak conductor. The conductor is truncated by a distinct topographic lineament and a minor VLF conductor to the north. A large cluster of uranium-rich soil samples was also identified in this area.

DUBAWNT BASIN PROJECT
TED AND TAD CLAIMS
NIRVANA GRID
Urangesellschaft Canada Ltd.

Uranium
75 P/7
63°10'N,104°32'W

REFERENCES

Gibbins (1984).

DIAND assessment report 081550.

PROPERTY

TED 1-4, TAD 1-7.

LOCATION

The claims are south and west of the Radford River, where it forms the southwest boundary of the Thelon Game Sanctuary. This area is 7 - 10 km southeast of Hoare Lake and about 500 km east to east-northeast of Yellowknife (Fig. 6-2).

HISTORY

The TED claims were staked in 1971 to cover favourable areas of Prospecting Permit 384 issued in 1976. The TAD claims were staked in 1981. Geological mapping was carried out in 1978 and 1980. Soil sampling in 1980 indicated several areas containing up to 9 ppm uranium.

DESCRIPTION

The TED and TAD claims are underlain by a suite of gneissic and granitic rocks that are Aphebian or older. The gneisses have a foliation trend of northeast to southwest and are steeply dipping. Massive gabbroic dykes and sills intrude these units striking in a north-south direction. Unconformably overlying this sequence is the flat-lying Paleohelikian Thelon sandstone of the Dubawnt group.

CURRENT WORK AND RESULTS

1982:

Most of the 1982 work was done on the Nirvana grid, which mainly covers the northern part of TED 2 and the central part of TED 3. Preliminary results of an airborne Input survey, flown earlier in the season, outlined several weak but persistent Input conductors. These Input conductors, along with anomalous soil samples that were taken during the 1980 Radford River reconnaissance program, sparked interest in this area.

Sparse outcroppings of a mixture of felsic to intermediate paragneisses, trending Az 35°, occur in the western corner of the grid area (northwest corner relative to grid north), the northeastern half of the grid appears to be underlain by Thelon Formation. However, most of the area is covered with muskeg and overburden.

Several hundred A_0 horizon soil samples were collected and analyzed for uranium by delayed neutron counting techniques. Clusters of readings greater than 4 ppm uranium in the western part of the grid are elongated parallel to the strike of the basement rock and to a lesser degree parallel the westerly glacial direction. These clusters are associated with VLF and/or HLEM conductors. Only a few minor spot anomalies occur east of the sub-Thelon Formation unconformity. A radiometric survey of the grid revealed anomalous readings corresponding to areas of outcrop.

The uranium potential of several weak 2 channel Input anomalies on the Nirvana grid were tested by a ground VLF (Geonics EM 16) survey and several northeast-trending conductors were delineated on the western half of the grid. A horizontal loop EM (Max-min II) survey over the western portion of the grid confirmed the VLF conductive zones and suggested they are caused by shallow bedrock conductors.

A broad magnetic low corresponds closely with the assumed trace of the unconformity and may indicate a weak alteration zone.

1983:

The TAD 1-7 and TED 1 and 4 claims were allowed to lapse.

DUBAWNT BASIN PROJECT

MARY 1-4: EYEBERRY GRID	Uranium
Urangesellschaft Canada Ltd.	75 P/2
	63°10'N,104°32'W

REFERENCES

Curtis and Miller (1980); Gibbins (1983b, 1984).
DIAND assessment report 081578.

PROPERTY

MARY 1-4.

LOCATION

The claim area, which includes the Eyeberry grid, is located east of Eyeberry Lake, 510 km east-northeast of Yellowknife and 425 km west-southwest of Baker Lake.

HISTORY

Reconnaissance geochemical surveys on Prospecting Permit 383 in 1976-1977 identified two first-order uranium anomalies in overburden west of a ridge of Hurwitz Group quartzite. The MARY claims were staked in 1979 to cover these anomalies.

Prospecting, mapping and soil sampling were carried out to the northeast of Eyeberry Lake in 1977 and 1978. Several soil samples anomalously enriched in uranium were collected immediately west of the quartzite ridge, but no anomalous radioactivity was detected. In 1979 airborne, radiometric, magnetic and VLF-EM surveys detected anomalies suggesting that the orthoquartzite ridge is the surface expression of a horst block. The radiometric survey did not detect anomalous radioactivity on the claim (Gibbins, 1983b).

In 1980, the Eyeberry grid was established to further investigate the airborne-detected VLF anomalies on the flanks of the quartzite ridge near the area of soil anomalies described above. VLF and Max-Min II surveys were carried out over this grid and two gravity profiles were run over the ridge. These surveys defined a 2 mgal gravity step along the profile lines coincident with the VLF anomalies. No response was detected by the Max-Min.

In 1981, geological, geochemical, airborne and ground magnetometer surveys were done. Weak to moderate Input anomalies on the west flank of the quartzite ridge have an extremely weak EM response on the ground. The ground magnetometer survey indicates the presence of a magnetic dyke-like body. A large area of anomalous uranium in the A_0 soil horizon at the western margin of the Eyeberry grid may represent downslope dispersion of uranium from a source near the Input anomalies (Gibbins, 1984).

DESCRIPTION

The only outcrop on the MARY claims is orthoquartzite, exposed as a prominent ridge northeast of Eyeberry Lake. This orthoquartzite, which has been tentatively correlated with the Aphebian Hurwitz Group (Curtis and Miller, 1980), is massive, clean, white to pinkish and weakly banded. The orthoquartzite strikes N15°E, parallel to the trend of the ridge, and dips vertically. The ridge is thought to be the surface expression of horst faulting, and VLF-EM surveys across the ridge have detected conductors that support this contention. The rest of the MARY group is believed to be underlain by sandstone of the Helikian Thelon Formation.

CURRENT WORK AND RESULTS

A total of 36.4 line-km of HLEM (Apex Max-min using a 250 m cable separation and 3555 Hz and 888 Hz frequencies) was completed on the Eyeberry grid. This confirmed the presence of a weak airborne EM conductor, previously defined by the 1981 INPUT survey. A second INPUT conductor could not be checked as the area is under a lake.

Deep penetrating EM work is recommended as the conductors seem to be deeply buried.

MARY 1-6	
PNC Exploration (Canada) Ltd.	**Uranium**
Box 11571	**65 L/5**
3060 - 650 W. Georgia St.	**62°7'N,103°38'W**
Vancouver, B.C., V6B 4N8	

REFERENCES

Donaldson (1965, 1969); Gibbins (1984); Laporte (1974, 1979); Overton (1979); Wright (1967).

DIAND assessment report 081618.

PROPERTY

MARY 1-6. 65 L/5

LOCATION

The MARY claims are midway between Mosquito Lake and Sid Lake (Fig. 6-2). This area is 550 km east of Yellowknife and 530 km northeast of Fort Smith.

HISTORY

Prospecting Permit 149 (65 L/5) was held by Gage Canadian Oil and Gas Corp from 1969 to 1971. They did radiometric prospecting, geology and geochemistry in 1970, but did not detect any anomalous radioactivity (Laporte, 1974).

Prospecting Permit 371 (65 L/5) was held by Urangesellschaft Canada Ltd. from 1976 to 1978 (Laporte, 1979).

Esso Resources Canada Ltd. obtained Prospecting Permits 737 and 738 (65 L/5, N half) in 1980 and did airborne radiometric surveys and lake-water and sediment sampling (Gibbins, 1984). These permits were relinquished in 1982.

The MARY claims were recorded on September 9, 1982.

DESCRIPTION

The claims are underlain by generally flat-lying sandstones of the Thelon Formation of Donaldson (1965, 1969). The depth to the Archean/Aphebian basement in the area has been estimated at 175 metres (Overton, 1979). Basement gneiss occurs 10 km southeast of the MARY claims. More than 80% of the permits are covered by glacial till and sand.

CURRENT WORK AND RESULTS

1982:

Two large sandstone outcroppings near the center of the claims are radioactive. The Thelon Formation-basement unconformity was mapped to the east, along the east shore of Mary Lake (Fig. 6-2).

Lake-sediment sampling of the MARY claims and adjacent area yielded moderately anomalous results. Reconnaissance boulder prospecting and sampling disclosed radioactive boulders of sandstone near outcrop and probable subcropping source rock.

A grid was established in the northwest part of the MARY 5 claim and scintillometer, magnetometer, VLF EM-16 surveys and soil sampling were done to test the area.

DUNKEL LAKE PROJECT

DUB CLAIMS	Uranium
PNC Exploration (Canada) Co. Ltd.	65 M/2
Box 11571	63°07'N,102°48'N
3060 - 650 W. Georgia St.	
Vancouver, B.C., V6B 4N8	

REFERENCES

Eade (1981b); Gibbins (1984); Laporte (1974, 1979); Wright (1967).

DIAND assessment reports 081801, 019962, 061560.

PROPERTY

DUB 1-6. 65 M/2

LOCATION

The claims are 30 km west of the west side of Dubawnt Lake. They are immediately north of Urangesellschaft Canada Ltd.'s LYNN claims and south of the Clarke River that defines the southern boundary of the Thelon Game Sanctuary.

HISTORY

NTS area 65 M/2 was previously protected by Prospecting Permit 128 granted to Canadian Delhi Oil in 1969 (Laporte, 1974), Permit 373 of Urangesellschaft Canada Ltd. from 1976 to 1978 (Laporte, 1979) and Permits 715 and 751 of Hudson's Bay Oil and Gas Ltd. from 1980 to 1983 (Gibbins, 1984). The DUB 1-6 claims were staked in February, 1984.

DESCRIPTION

The project area lies along the eastern boundary of the southeastern Thelon Basin, just south of the Thelon Game Sanctuary. Basement rocks of Archean (Eade, 1981b) or Aphebian (Wright, 1967) age underlie the eastern half of the claim group, while shallow-dipping Thelon Formation sandstone and conglomerate cover the eastern half. North-northwest-trending diabase dykes are the youngest rocks in the area.

Radioactive zones of hematized sandstone were found on the adjacent LYNN claims by Urangesellschaft Canada Ltd. in 1980 (Gibbins, 1984, p. 210).

CURRENT WORK AND RESULTS

In 1983 PNC Exploration (Canada) Ltd. did reconnaissance exploration work in the 'Dunkel Lake' area, west of Dubawnt Lake. The work included magnetic, EM and scintillometer surveys, boulder prospecting, geological mapping, and rock, overburden, lake bottom and stream sediment sampling. Petrographic work and aeromagnetic interpretation were contracted out to consulting firms.

The results of this work are confidential until May, 1987.

PROSPECTING PERMITS 776 AND 777

CROFT CLAIMS	Uranium
PNC Exploration (Canada) Co. Ltd.	75 H/16; I/1
Box 11571	62^0N,$104^0$15'W

3060 - 650 W. Georgia St.
Vancouver, B.C., V6B 4N8

REFERENCES

Dahlkamp (1978); Gibbins (1983b, 1984); Padgham and others (1978); Wright (1967).

DIAND assessment report 081619.

PROPERTY

Prospecting Permits 776 and 777	75 H/16
CROFT 1-29	75 I/1
CROFT 30-35	75 H/16

LOCATION

The claims and permits are in the vicinity of Croft and Foster Lakes at the southwestern tip of the Thelon Basin (Figs. 6-2, 6-7), some 200 km southwest of Dubawnt Lake and 500 km east-southeast of Yellowknife.

Foster Lake lies within the western of the two adjacent permits and CROFT 1-29 lies between permits 776 and 777 to the south and Croft Lake to the north.

HISTORY

Prospecting Permits 776 and 777 were granted in January,1981. The adjacent CROFT 1-23 claims in 75 I/1 were added in April,1979 and the remaining CROFT claims were added later in the same year. NTS area 75 I/1 was previously covered by Prospecting Permit 152 (Bow Valley Land Co. Ltd.) in 1969-70 (Padgham and others, 1978) and 379 (Urangesellschaft Canada Ltd.) in 1976-78.

Urangesellschaft Canada Ltd. retained part of Permit 379 by staking the ROB and WAWA claims in 1978 (Fig. 6-3 and Gibbins, 1983b, p. 140-141). Two inliers of kaolinized and hematized regolithic basement rock were found in the bank of a stream in the northwest corner of the ROB group. On the WAWA group, kaolinized gneiss regolith with low-grade uranium is also exposed below the sub-Thelon Formation unconformity in a river valley known as Laurie's Canyon.

Following the acquisition of Prospecting Permits 776 and 777 by PNC Exploration (Canada) Ltd., Taiga Consultants Ltd. and Paterson Grant and Watson Ltd. were contracted to compile and interpret photo and aeromagnetic maps. In June, 1981, Kenting Earth Sciences Ltd. was contracted to conduct a combined airborne magnetic, electromagnetic and radiometric survey of some 676 sq. km covered by the permits and claims. Kenting also did a heliborne radiometric survey that detected numerous uranium anomalies (Gibbins, 1984). PNC Exploration (Canada) Ltd.

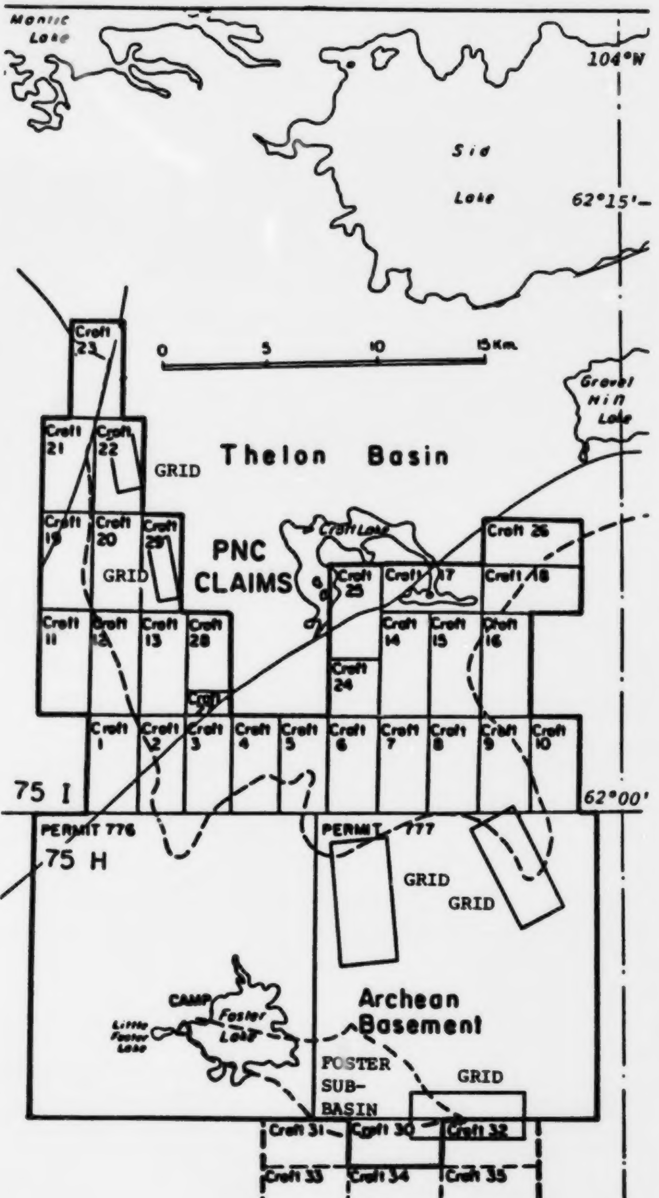

Monitic Lake
104°W
Sid Lake
62°15'
0 5 10 15Km
Gravel Hill Lake
Thelon Basin
PNC CLAIMS
GRID
Croft Lake
Croft 1
Croft 2
Croft 3
Croft 4
Croft 5
Croft 6
Croft 7
Croft 8
Croft 9
Croft 10
Croft 11
Croft 12
Croft 13
Croft 14
Croft 15
Croft 16
Croft 17
Croft 18
Croft 19
Croft 20
Croft 21
Croft 22
Croft 23
Croft 24
Croft 25
Croft 26
Croft 27
Croft 28
Croft 29
75 I
62°00'
PERMIT 776
75 H
PERMIT 777
Archean Basement
CAMP
Foster Lake
Little Foster Lake
FOSTER SUB-BASIN
Croft 30
Croft 31
Croft 32
Croft 33
Croft 34
Croft 35

FIGURE 6-7: PNC Exploration (Canada) Ltd. - Croft Lake - Foster Lake claims and permits

geologists did reconnaissance geological mapping, boulder prospecting and lake-sediment sampling surveys. Later, a detailed grid was set up on the CROFT 22 claim. Subsequently, ground geophysical surveys (magnetic, EM and radiometric) and a soil geochemical survey were done on the grid. Several minor soil and radiometric anomalies were detected.

DESCRIPTION

The area covers the extreme southwest tip of the Thelon Basin (Wright, 1967 and Fig. 6-7). The favorable sub-Thelon Formation unconformity varies from a few metres to several hundred metres deep on the northern group of CROFT claims in 75 I/1. The permits (75 H/16) are extensively covered with overburden. Glacial landforms include eskers, pitted outwash, strandlines, crevasse-fillings, dead-ice moraine and ground moraine. Sandy drift, probably derived from the underlying Thelon sandstone, thickens towards the north and is probably wind modified. Joint and fault patterns in bedrock can be seen as lineaments through the thinner glacial overburden.

Targets for uranium exploration in the area include: (i) unconformity vein-type deposits within basement, Aphebian metasediments and Dubawnt Group rocks (Dahlkamp, 1978); (ii) stratabound deposits in Lower Proterozoic metasediments; (iii) detrital deposits in Lower Proterozoic pyritic quartz-pebble conglomerates; and (iv) disseminated or pegmatitic deposits in basement rocks.

CURRENT WORK AND RESULTS

1982:

During the 1982 field season, PNC Exploration (Canada) Ltd. completed reconnaissance mapping and boulder prospecting. Anomalously uraniferous lake sediments were analyzed for thorium and lead and uraniferous Thelon Formation samples were analyzed for P_2O_5. Several additional grids and minigrids were constructed (Fig. 6-7). Follow-up work on these grids comprised 1:5,000 scale mapping, boulder prospecting and magnetometer, EM-16, scintillometer, radon detection and soil sampling surveys. More detailed surveys were done on minigrids.

a) Geology

The erosional trace of the sub-Thelon Formation unconformity was prospected and mapped across the property. This included the discovery of an outlier of Thelon Formation sandstone, 'the Foster Sub-Basin', east of Foster Lake (Fig. 6-7) and about 15 km south of the previously mapped limits of Thelon Formation sandstone (Wright, 1967). The presence of sub-Thelon Formation regolith and northeast-trending fault systems and paragneiss belts favour the discovery of unconformity related uranium deposits, despite the lack of graphite conductors and the scarcity of radiometric anomalies with U/Th ratios greater than unity. A volcanic vent breccia, discovered on Croft 22, suggests the possibility of finding Christopher Island - type uranium-copper - silver-gold-selenium deposits (Miller, 1980, p. 10).

b) Magnetic surveys

Airborne and ground magnetometer surveys were useful in delineating the trace of the unconformity.

c) Electromagnetic surveys

The lack of deep Tridem AEM conductors was explained by a lack of graphite in the bedrock. Ground EM-16 surveys helped trace the unconformity on grids in Prospecting Permit 777.

d) Radiometric surveys

Potassium- and thorium-channel radiometrics proved to be a useful mapping tool, as basin and basement rocks are characterized by high Th- and K-channel radiometric signatures. Uranium anomalies are rare. Some radiometric anomalies correlate with high surface radon flux.

e) Overburden (soil) geochemical surveys

Soil sampling surveys on grids in Prospecting Permit 777 outlined several areas which were anomalous (i.e. greater than 10 ppm U; U/Th generally greater than 1) and slightly anomalous (i.e., 3 - 10 ppm U; U/Th generally less than 1). U/Th ratios exceeding unity are rare and the areas represented by the sample sites are generally small.

f) Radon techniques

Cartridges containing activated charcoal were buried for five to eight days and the amount of gamma radiation due to radon 222 and its daughter products was measured once thoron had reached equilibrium. Results from grids and minigrids are generally disappointing, suggesting that either the presence of continuous permafrost reduces radon 222 flux to surface or that these areas are not underlain by concentrations of uranium. There was good correlation with scintillometer survey data.

1983:

The permits and all the claims in NTS area 75 I/1 (CROFT 1-29) were allowed to lapse.

NONACHO BASIN

INTRODUCTION

The Nonacho Group is a conformable sequence of mainly continental sediments consisting of conglomerates, lithic sandstones (arkose) and shale (Table 6-3), that have been deposited in an intra-cratonic, fault-controlled basin. They appear to be Middle Aphebian in age and are comparable to the Martin Group of northern Saskatchewan. Basement rocks are mainly Early Aphebian to Archean granites and gneisses including numerous mylonite or cataclasite zones. A belt of Archean to Aphebian Tazin Group paragneisses extends northward from Saskatchewan into the Hill Island Lake area (Mulligan and Taylor, 1969; Bostock, 1984). Diabase dykes represent the last Precambrian events.

The geology of the Nonacho Lake area has been summarized by McGlynn and others (1974), and McGlynn (1970a, 1971a). Uranium-bearing minerals associated with granitic rocks include pitchblende and allanite. Within the Nonacho Group uranium is found as pitchblende in narrow fracture fillings and small veinlets in quartz stockworks, commonly in deformed rocks.

Mineral exploration in the area has been sporadic over the years. Renewed interest in uranium in 1976 coincided with the release of Geological Survey of Canada Open Files 324, 325 and 326 (Hornbrook and others, 1976) which reported the results of lake sediment geochemical surveys, and the release of airborne gamma-ray survey Map 37075G (G.S.C. Uranium Reconnaissance Program, 1976). These results, combined with an earlier airborne radiometric study (Darnley and Grasty, 1972) and promising geology, resulted in considerable staking and exploration since 1976.

The 1979 level of exploration in the Nonacho area was higher than in any previous year, and several companies carried out major projects. This work included diamond drilling, airborne geophysical surveys, geological mapping and detailed systematic prospecting involving expenditures of 2-3 million dollars. From 1980 to 1982, exploration tapered off, with only Uranerz Exploration and Mining Ltd. and PNC Exploration (Canada) Ltd. working on major programs. Summaries of the 1980-81 work are given in Gibbins, 1984.

TABLE 6-3: STRATIGRAPHIC UNITS - NONACHO BASIN (from McGlynn, 1978)

NONACHO GROUP	
Nam	Lithic sandstone, arkose or feldspathic sandstone, with interbeds of grey, greenish grey or, more rarely, red mudstone, or with beds of mudstone chip conglomerates or reworked mudstone chip conglomerates.
Nap	Lithic sandstone, arkose or feldspathic sandstone with single-pebble bands or reworked pebble bands.
Nac	Lithic sandstone, arkose or feldspathic sandstone with interbeds of polymictic conglomerate or, near the base of the sequence, oligomictic conglomerate.
Ncq	Polymictic conglomerate with interbeds of lithic sandstone, and rarely, mudstones. The unit consists of a large number of fining-upward cycles of conglomerate with clasts of decreasing size upwards in the cycle grading to sandstones and finally, mudstones. This conglomerate is characterized by a significant clast component of white weathering, light grey metaquartzite in addition to a variety of granitic rocks. This unit occurs at several stratigraphic horizons within the sandstone units.
Nca	Polymictic conglomerate with interbeds of arkose or lithic sandstone in fining-upward sequences. Clasts include a variety of granitic rocks with minor amounts of extrusive or hypabyssal intrusive feldspar porphyry, amphibolite, vein quartz, shale or slate, and mylonite or sheared granitic rocks. White quartzite clasts are rare.
Ncb	Basal oligomictic conglomerate and breccia comprising angular to subangular clasts of basement rocks in a lithic sandstone matrix. This unit rests on basement and grades upward into an arkose or lithic sandstone containing thin beds of oligomictic conglomerate or scattered, large (up to 6 inches) angular clasts of basement rock. Away from the margin of the basin these conglomerates tend to become polymictic.
BASEMENT B	Migmatites, granitic gneisses and massive granitic rocks; B_s sheared or brecciated basement rocks; flaser gneisses; B_m mylonite zones in basement rocks.

Exploration was mainly for unconformity related uranium deposits similar to those found in northern Saskatchewan (e.g. Key Lake, Dahlkamp, 1978, 1979). Exploration techniques, which emphasised geophysical prospecting (Patterson and others, 1979), lake water and sediment geochemistry, and boulder tracing, are identical to those used in northern Saskatchewan. However, there is inconclusive evidence for a regolith below the sub-Nonacho unconformity.

Numerous other types of uranium occurrences, particularly Beaverlodge-type pitchblende veins related to mylonite, fine-grained mafic dykes and albitite host rocks, have been found in the area, but so far none have shown economic potential.

Bostock (1982) recently remapped the basement rocks south and southwest of the Nonacho Basin in NTS 75 C and L. Aspler (1985) has mapped and studied the structure and sedimentation of the Nonacho Basin sediments.

NONACHO LAKE PROJECT

Uranerz Expl'n and Mining Ltd.	Uranium
#204, 229-4th Avenue South	75 C/13,14; F/3,6
Saskatoon, Sask., S7K 5M5	60°50'-61°20'N
	109°10'-109°30'W

REFERENCES

Gibbins (1981, 1983a,b, 1984); Mulligan and Taylor (1969); Taylor (1971).

DIAND assessment reports 081503, 081601 and 081719.

PROPERTY

Numerous claim groups including:

JIM 1-39	75 F/6
VIP 1-12	75 F/6
URY 1-12	75 F/11
BLUE 1-3	75 F/15

LOCATION

The Nonacho Lake project encompasses an area of 25,000 square kilometres southeast of Great Slave Lake. However, since 1979 most effort has been confined to a cataclastic zone extending from Heron Lake to the Thoa River. The center of the area is 175 km northeast of Fort Smith and 300 km southeast of Yellowknife.

The locations of specific prospects are given in Figure 5-8 of Gibbins (1984, p. 236).

HISTORY

Uranerz Exploration and Mining Ltd. began reconnaissance exploration for uranium in the Nonacho Basin in 1977. The contact between Middle Aphebian Nonacho Group sediments and basement granites and gneisses was the main exploration target. Airborne radiometric surveys, reconnaissance mapping, prospecting and some detailed work was completed in 1977 (Gibbins, 1981).

In 1978, Uranerz Exploration and Mining Ltd.'s exploration team completed their reconnaissance survey of the Nonacho Basin and discovered, staked and examined several uranium showings. Questor Surveys Ltd. was contracted to do airborne Input-EM and magnetic surveys and Sander Geophysics Ltd. to do airborne VLF-EM and magnetic surveys. Detailed surficial and bedrock studies, soil geochemistry, trenching and sampling were done near showings on the various claim groups, (Gibbins, 1983a).

In 1979 more than 3,000 m of drilling was done in a small area near the apex of a uraniferous boulder train at 'Mosquito Gulch', just west of 'Octopus Lake' (MG 21-28, 60°58'N, 109°19'W) where disseminated uraninite and pitchblende occur within metasomatic albitite. The mineralization was generally low grade and discontinuous; the best intersection returned 0.356% U_3O_8 over 7.3 m.

IP/resistivity surveys were completed at Mosquito Gulch and Heron Lake and a ground magnetometer survey at Mosquito Gulch. These geophysical surveys did not outline the mineralized zones.

Detailed mapping, radiometric prospecting and geochemical surveys were done between Heron Lake and Thoa River. Over 1,100 lake-water and sediment samples were collected and analyzed at a sample density of one sample per square km. Anomalies greater than 50 ppm U_3O_8 in lake-sediments, and 0.8 ppb U_3O_8 in lake-waters were identified in numerous locales, several of which correspond to previously discovered radioactive zones. However, there were no anomalies in the Mosquito Gulch-Octopus Lake area. The best results were obtained in the Smudge Lake area (Gibbins, 1983b, p. 152).

In 1980 Geophysical Surveys Inc. was contracted to fly a combined radiometric and magnetic survey of the cataclastic zone between Heron Lake and the Thoa River. This survey consisted of 2771 line-km with a line spacing of half a kilometre. Uranium showings tend to coincide with magnetic lows, possibly due to retrograde greenschist facies metamorphism in these areas.

Dr. Peter Fischer was contracted to do a geologic and petrographic study of the cataclastic zone. His report contributed to the metamorphic and structural interpretation of the area.

A multi-element lithogeochemical study, using chip samples collected from selected diamond drill core of the Mosquito Gulch area, was done to determine if uranium is associated with other elements that may be used as pathfinders for exploration. Of particular interest is the association of uranium with sodium, since albitite is commonly associated with uranium in the Nonacho Lake area.

Detailed mapping and radiometric survey traverses between Heron Lake and Thoa River outlined approximately 25 radioactive outcrops in the Smudge/Dali Lakes area. More than 4400 m were drilled on the Mosquito Gulch (Octopus Lake), Heron Lake, Ski Hill and Smudge prospects. A summary of this work is given in Gibbins (1984, p. 235-238).

Metallurgical tests for uranium leachability were done on Mosquito Gulch core at the company's laboratories in Germany.

The 1981 reconnaissance mapping was focused in four areas: between Powder and Anderson Lakes, south of the Thoa River, and east and west of Kidder Lake. Prospecting was carried out on the Stewart Lake, Jerome Lake and Shamie Lake showings. Prospecting in the Shamie Lake area east of Kidder Lake outlined several uraniferous zones and boulder fields. The surficial deposits of the Smudge area were mapped and the uraniferous boulder fan and its probable source were defined. Polonium 210 and uranium were analyzed in soil samples from Mung Arm, Smudge Lake and Heron Lake. Trenching and sampling were done at Smudge, Mung Arm, Mosquito Gulch, Ski-Hill and the Shamie II showings.

Studies of mineralogy, petrology and geochronology were undertaken and bulk samples from Mosquito Gulch and Mung Arm were shown to be amenable to radiometric ore sorting, with recoveries of 81 and 90% respectively.

The 1980 airborne radiometric and magnetic survey of the cataclasite zone was interpreted to select radiometric anomalies to be tested in 1982. The magnetic surveys show the area is transected by three major joint sets trending north, east and northeast. Magnetic surveys are also useful in outlining lithologic units, but not the economically significant albitized units.

DESCRIPTION

The basement rocks of the area are composed of fine grained to pegmatitic granitic rocks, paragneiss and diabase. Isolated remnants of what are believed to be Lower Aphebian sediments, possibly related to the Tazin Group metasediments and paragneisses of the Hill Island Lake and Tazin Lake areas to the south, occur in this basement. However, these remnants are tightly folded and extremely sheared, making correlations rather dubious.

When not faulted, the base of the overlying Nonacho Group sediments is normally a basal conglomerate resting unconformably on the basement. Granite and gneissic boulders predominate at the base. The Nonacho Group is folded and faulted along northeast trends.

In the southeast corner of the basin, a mappable unit referred to as the cataclastic zone is made up of both the Archean basement and the Lower Aphebian metasediments. As the name suggests, this zone was structurally formed and consists of quartz-feldspar cataclasite, feldspar cataclasite, banded mylonite and massive chloritic lenses. The cataclastic zone shows retrograde metamorphism from lower-amphibolite to greenschist facies. Hydrothermal activity, mainly restricted to the cataclastic zone, resulted in the deposition of several small pitchblende showings.

Mulligan and Taylor (1969) and Taylor (1971) published the most recent geologic maps that are available.

Recent exploration of the Nonacho Lake project has been for uranium in albitites, which can be low-grade (less than 1000 ppm) - large tonnage deposits like those found in the USSR or high-grade (1700 ppm) - medium tonnage deposits like the Gunnar deposit of northern Saskatchewan, 170 to 200 km to the south.

CURRENT WORK AND RESULTS

Uranerz Exploration and Mining Ltd.'s 1982-83 work consisted of follow-up work in selected areas, mainly geological and geophysical surveys and trenching. From the Powder Lake base camp, small areas of the BLUE, URY, VIP and JIM claims were explored in 1982 and the VIP 3 claim in 1983.

NONACHO LAKE PROJECT

JIM 1,3,8,9,11-13,26	Uranium
VIP 1-12	75 F/3
	$61^{0}13$'N,$109^{0}20$'W

REFERENCES

Gibbins (1983a); Taylor (1971).
DIAND assessment report 081601.

LOCATION

The JIM claims are 5 km east and southeast of Naskethey Lake. They cover the eastern boundary of the southeastern Nonacho Basin between Heron and

Powder Lakes. The VIP 1-12 claim group forms a 6 by 18 km area that borders the JIM claims on the west and shares a common northeast corner with Hatchet Lake (Figs. 6-8, 6-9).

HISTORY

The claims were staked in 1978 to protect a number of radioactive showings and boulders of chloritized metasediment.

DESCRIPTION

The claims include the east limb of a crescent-shaped outlier of Nonacho Group metasediments. This limb extends from Naskethey Lake to Powder Lake, (Taylor, 1971). The claims are underlain by Archean/Lower Aphebian basement composed mainly of metasediments with gradational contacts into gneisses and granitic gneisses. Superimposed on the metasedimentary basement are mylonitization and cataclasis along fault zones together with partly to intensely albitized rocks. Most of the radioactive occurrences encountered were associated with albitized metasediments while some were associated with the Nonacho Group quartzites.

CURRENT WORK AND RESULTS

Geological mapping was done in selected areas along traverses across the Nonacho Group/basement contact, along structures and in areas of basement lithologies. Ground radiometric surveys were done in connection with the geological mapping to locate radiometric anomalies recorded by a 1980 helicopter-borne survey. Of 39 anomalies investigated, 11 were associated with uraniferous zones, while 28 either could not be found or were interpreted to be the result of high background or topographic effects.

Trenches were blasted to probe two radioactive anomalies on the JIM 11 claim, the Deka North and Deka South showings. The anomalies are in Nonacho Group quartzite that has been bleached (albitized) and partly hematized in an east-northeasterly trending zone 50 m to 80 m wide and 150 m long. At the Deka North showing, about forty thousand cps (URTEC) was detected in a 20 cm by 150 cm heavy mineral band that was blasted away upon trenching. Radioactivity in a limonite-stained fracture 3 m south of the heavy mineral band increased from 2500 cps to 3000 cps after trenching. At the Deka South showing, 50 m south of Deka North, spot highs of up to 1500 cps were detected. Trenching revealed that the alteration zone forms a 25 to 100-cm-thick crust overlying reddish to purple quartzite that is cut by narrow (50 mm) quartz veins, some of which contain minor carbonate. Radioactivity in one vein was 3 to 6 times background.

NONACHO LAKE PROJECT

VIP 3

Uranium
75 F/3
61°13'N,109°28'W

REFERENCES

Gibbins (1984).

DIAND assessment report 081719.

LOCATION

The VIP 3 claim is 1 to 6 km west of Hatchet Lake (Figs. 6-8, 6-9).

HISTORY

The VIP 3 claim was recorded on October 11, 1978.

DESCRIPTION

The geology of the VIP 3 claim is shown in Figure 6-8. More than 75% of the claim block is underlain by basement lithologies consisting of porphyroblastic

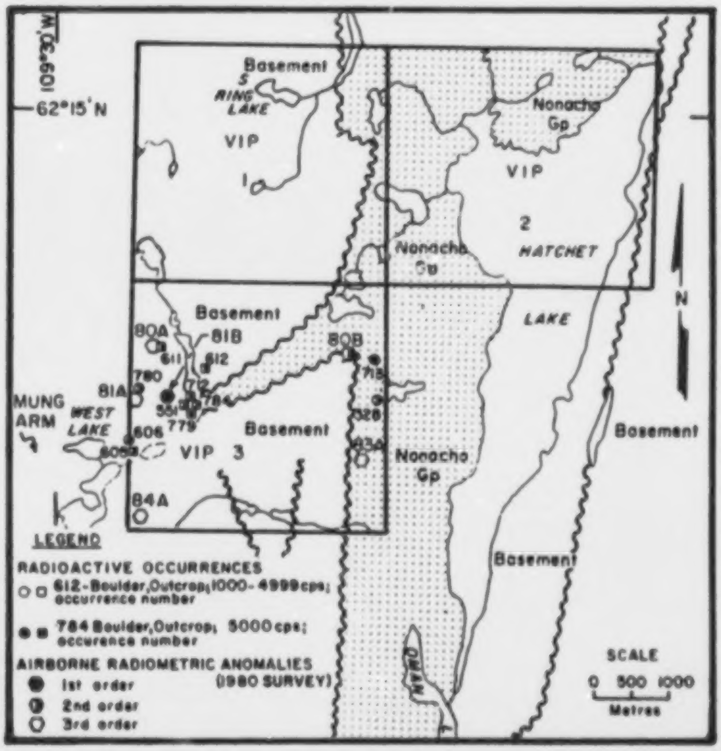

109°30'W
62°15'N
Basement
5
RING LAKE
VIP
1
Nonacho Gp
VIP
2
HATCHET
Nonacho Gp
LAKE
N
Basement
80A
81B
611
612
80B
715
780
81A
712
784
551
779
MUNG ARM
WEST LAKE
606
605
VIP 3
Basement
328
83A
Nonacho Gp
84A
Basement
LEGEND
RADIOACTIVE OCCURRENCES
612-Boulder,Outcrop;1000-4999cps; occurrence number
784 Boulder,Outcrop; 5000cps; occurence number
AIRBORNE RADIOMETRIC ANOMALIES (1980 SURVEY)
1st order
2nd order
3rd order
SCALE
0 500 1000
Metres

FIGURE 6-8: Simplified Geology and radiometric anomalies. VIP-3 claim of Uranerz Exploration and Mining Ltd.

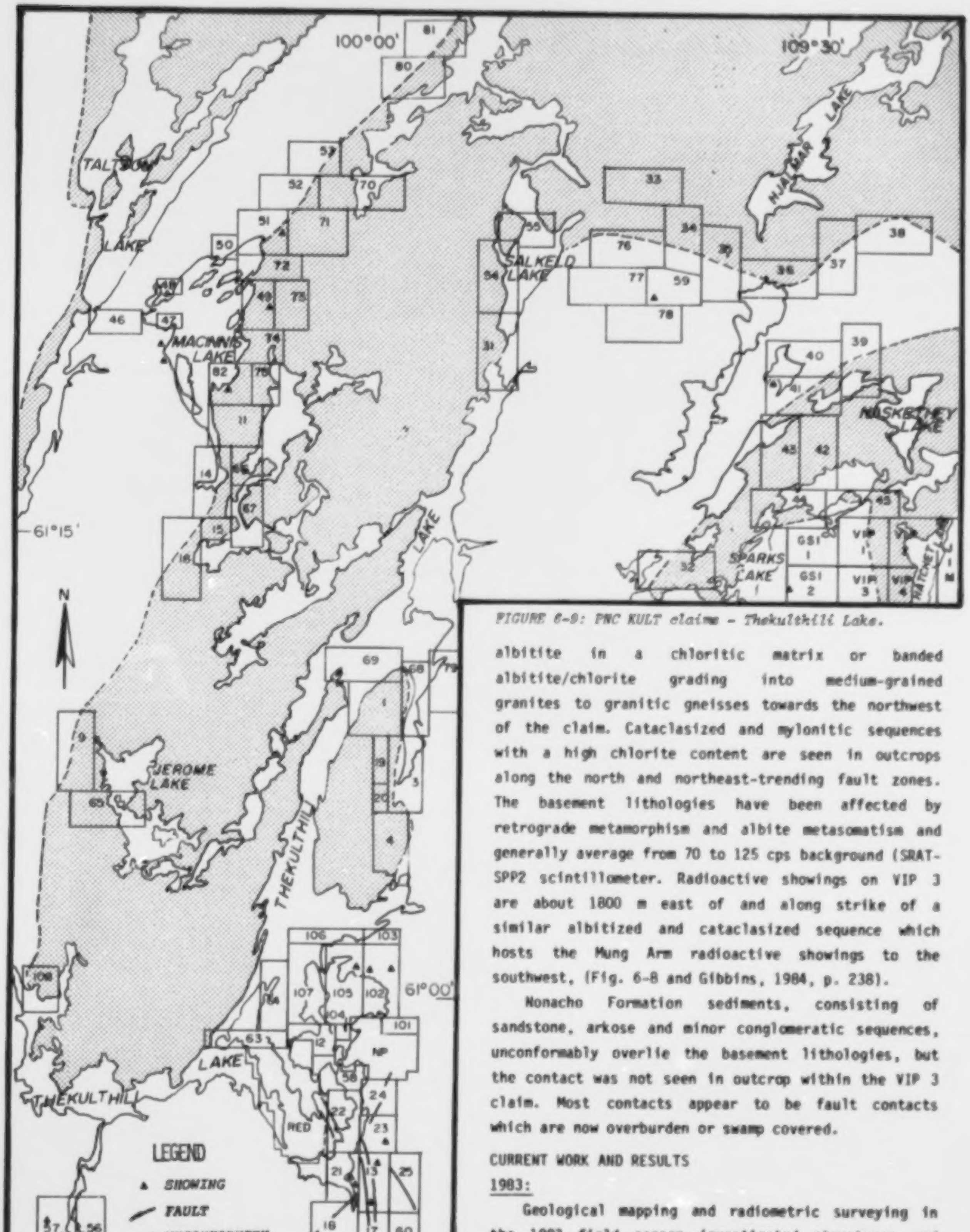

100°00'
109°30'
61°15'
61°00'
TALTSON LAKE
MACINNIS LAKE
SALKELD LAKE
HJALMAR LAKE
NASKETHEY LAKE
SPARKS LAKE
JEROME LAKE
THEKULTHILI LAKE
THEKULTHILI LAKE
HATCHET LAKE
N
GSI 1
GSI 2
VIP 1
VIP 3
VIP 4
NP
RED
LEGEND
SHOWING
FAULT
UNCONFORMITY
Nonacho Group
SCALE
0
5
10km

FIGURE 6-9: PNC KULT claims - Thekulthili Lake.

albitite in a chloritic matrix or banded albitite/chlorite grading into medium-grained granites to granitic gneisses towards the northwest of the claim. Cataclasized and mylonitic sequences with a high chlorite content are seen in outcrops along the north and northeast-trending fault zones. The basement lithologies have been affected by retrograde metamorphism and albite metasomatism and generally average from 70 to 125 cps background (SRAT-SPP2 scintillometer. Radioactive showings on VIP 3 are about 1800 m east of and along strike of a similar albitized and cataclasized sequence which hosts the Mung Arm radioactive showings to the southwest, (Fig. 6-8 and Gibbins, 1984, p. 238).

Nonacho Formation sediments, consisting of sandstone, arkose and minor conglomeratic sequences, unconformably overlie the basement lithologies, but the contact was not seen in outcrop within the VIP 3 claim. Most contacts appear to be fault contacts which are now overburden or swamp covered.

CURRENT WORK AND RESULTS

1983:

Geological mapping and radiometric surveying in the 1983 field season investigated structures and lithological relationships on the VIP 3 claim block. Two radioactive occurrences consisting of spot highs registering up to 12,000 cps were found in outcrops of porphyroblastic albitite in a chlorite matrix. The radioactive occurrences discovered on VIP 3 appear to be lithologically and structurally similar to the Mung Arm radioactive showings, 1800 m to the southwest.

Computer-assisted data processing and terrain classification of remotely-sensed Landsat imagery in the Mung Arm and the VIP 3 claim area did not detect a spectral signature characteristic of mineralization or albitization known to exist on the ground.

NONACHO LAKE PROJECT

URY CLAIMS - C.O. ISLAND	Uranium 75 F/11 $61^{\circ}32'30''$N,$109^{\circ}18'$W

REFERENCES

Gibbins (1983a).

DIAND assessment report 081601.

PROPERTY

URY 2	75F/11

LOCATION

The URY claims are on the east side of Hjalmar Lake and include the north part of a prominent island unofficially called C.O. Island.

HISTORY

The claims were staked in 1977 when radioactivity was found in narrow fractures in arkose and argillite. Associated hematite and anhydrite suggest a hydrothermal origin (Gibbins, 1983a).

DESCRIPTION

The area is underlain by folded Nonacho conglomerate and arkose.

CURRENT WORK AND RESULTS

1982:

A trench was blasted to expose a 'hot spot' in a highly contorted chlorite-filled fracture in arkosic quartzite. A chip sample across the 3.0 m length of the trench assayed 0.031% U_3O_8. A whole-rock geochemical sample showed a content of 9.86% Na_2O and indicates that sodium metasomatizing solutions penetrated the Nonacho sediments in this area. C.O. Island lies within 1 km of the basement contact near previously described albitite uranium occurrences drilled by Pan Ocean. The island is at the nose of a large northeast-trending syncline which would account for the contorted chlorite lenses.

NONACHO LAKE PROJECT

BLUE CLAIMS - BLUE LAKE	Uranium 75 F/15 $61^{\circ}58'$N,$108^{\circ}50'$W

REFERENCES

Gibbins (1983a).

DIAND assessment report 081503.

PROPERTY

BLUE 1-3	75 F/15

LOCATION

The claims are centered on Blue Lake, a small lake about 7 km northwest of Cobb Lake.

HISTORY

The claims were staked following the discovery of a uraniferous boulder fan in 1977-78. Surficial geology mapping by Bayrock Surficial Geology Ltd. outlined a boulder fan of more than 100 boulders of granite and granite gneiss. These boulders registered more than 1800 cps (SPP-2 scintillometer) and contained 0.055 to 0.766% U_3O_8. However, the small boulder fan could not be traced very far and roundness of boulders suggested a source less than 300 m in the up-ice direction (065°).

DESCRIPTION

The Archean basement on the east side of Blue Lake consists of granitic gneisses and paragneisses which form high rounded hills up to 200 or more feet above the lake level. The gneisses are well foliated and generally trend 025 to 035° with dips to the west at 35 to 50°. The gneisses consist mainly of quartz and feldspar with chlorite. Thin epidote-rich layers and cross-cutting veinlets as well as minor pyrite are also seen. Chlorite is the predominant mafic mineral and appears to be the retrograded remnant of biotites and amphiboles.

Nonacho Group sediments overlie the basement lithologies in the Blue Lake area and are believed to be in fault contact. However, the contact is covered by Pleistocene deposits.

CURRENT WORK AND RESULTS

Geological mapping failed to find additional radioactive boulders or outcrops. Magnetic and VLF/EM surveys indicate that favourable structures controlling uranium deposition may occur at the Nonacho/Basement contact but these structures are covered by Blue Lake. The limited extent and small size of the uraniferous boulder fan indicate a small source area at or near the Nonacho/Basement contact.

The BLUE claims have lapsed.

THEKULTHILI LAKE PROJECT

PNC Exploration (Can.) Co. Ltd.	Uranium
Box 11571, Vancouver Centre	75 C/13,D/16,E/1,8
3060 - 650 W. Georgia St.	75 F/4,5,12
Vancouver, B.C., V6B 4N8	61°N,110°W

REFERENCES

Bostock (1980, 1982); Donaghy (1977); Gandhi and Prasad (1980); Gibbins (1983a,b, 1984); Gibbins and others (1977); Henderson (1937, 1939a, 1983b); McGlynn (1966, 1970a, 1978); Mulligan and Taylor (1969); Taylor (1971).

DIAND assessment reports: 080170, 081564, 081727, 081728.

PROPERTY

RED 1-116; NP 1-63; KULT 1-82, 101-110.

LOCATION

The claims cover most of the Nonacho Group-basement unconformity in the Thekulthili Lake area (Fig. 6-9). This area is about 300 km southeast of Yellowknife and 160 km north of Fort Smith.

HISTORY

In 1977 Kenting Earth Sciences Ltd. carried out an airborne radiometric survey over the southern Nonacho Basin for PNC Exploration. The RED and NP claims were staked to protect anomalies detected by this survey. In 1978, additional reconnaissance lake-sediment and airborne radiometric surveys in adjacent areas led to the staking of the KULT claims. Detailed mapping and soil sampling were done in several areas of interest (Gibbins, 1983a).

The 1979 program included geochemical (lake sediment and soil) surveys, geologic mapping, ground radiometric and VLF-EM, airborne EM and additional staking (Gibbins, 1983b). Regional claim-block mapping and radiometric prospecting was carried out over most of the claims and a number of anomalous areas were identified for more detailed work. Most of the important anomalies are associated with fractures containing prominent hematite, minor pyrite-chalcopyrite and yellow uranium oxides. Geological work indicates that the Nonacho-basement contact is non-conformable, but affected locally by faulting.

Detailed geology, geophysical, soil geochemistry and/or radiometric surveys were done over grids cut on the NP, RED and KULT 12 and 13 claims. Uraniferous fractures were found in the basement igneous complex on grids F and G on KULT 13.

Thirty-two radiometric anomalies detected by the 1977 airborne survey were ground checked and Kenting Earth Sciences Ltd. did 1,800 km of airborne Tridem EM survey.

Work in 1980 included detailed claim mapping, radiometric, VLF-EM and geochemical surveys, trenching, a Track Etch survey and additional claim staking. Kenting Earth Sciences Ltd. did over 5000 line-km of airborne magnetometer, VLF-EM and radiometric surveys on behalf of PNC over the KULT 31-59 claims (Gibbins, 1984).

The 1981 exploration program for the South Thekulthili Lake Project consisted of claim block mapping, prospecting, regional radiometrics, geochemical and ground geophysical surveys, detailed grid surveys (geology, geochemical soil sampling and ground magnetics), blasting and trenching, 820 km of heliborne geophysical surveys of claim blocks KULT 18, 22-24 and 56-57 (Fig. 6-9), 3142 m of drilling (KULT 13 and RED 31) and staking new claims (KULT 60-64).

Detailed work on the grids included petrographic studies, rock geochemistry, mapping, soil sampling, lake-sediment sampling, scintillometer, VLF (Geonics EM-16), magnetometer and track-etch surveys (Gibbins, 1984).

Work on the North Thekulthili Lake Project (KULT 11,14-16,31-55 and 59) was mainly ground follow-up (prospecting, mapping and radiometric surveys) of a 1981 heliborne spectrometer survey (Gibbins, 1984).

DESCRIPTION

The oldest rocks in the Thekulthili Lake area are basement granites and gneisses of Archean to Aphebian age. These rocks are unconformably overlain by conglomerate, arkose and argillite units of the Nonacho Group of undefined Proterozoic age. The Nonacho and basement rocks have been faulted and folded along north-northeast-trending axes. The youngest rocks are undeformed diabase dykes.

The area is at the mutual corners of geological maps by Henderson (1939a), Mulligan and Taylor (1969), Taylor (1971) and Bostock (1982, 1984). McGlynn (1966 and 1978) mapped part of the claim area in detail, and Donaghy (1977) reviewed the geology of the Thekulthili Lake area and Gandhi and Prasad

(1980) the MacInnis Lake area. Bostock (1980, 1982); McGlynn (1970); and McGlynn and others (1974) have also discussed the geology of parts of the area.

CURRENT WORK AND RESULTS

1982:

In the summer of 1982, PNC Exploration (Canada) Ltd. intensified its exploration in the Nonacho Basin, employing 19 company and 17 contracted persons. The work is summarized in Table 6-4.

1983:

The work continued at an accelerated pace in the summer of 1983, as 18 company and 10 contracted personnel did a variety of exploration work (see Table 6-5).

Drilling

Several drilling programs were carried out in 1982-83. The two main areas of drilling are KULT 13 - southeastern Thekulthili Lake (spring 1982: 9 holes - 1821.5 m; summer 1982: 21 holes - 2358.7 m; and summer 1983: 11 holes - 1145.2 m) and KULT 49 and 51 - northeastern MacInnis Lake (summer 1982: 4 holes 700 m; spring 1983: 7 holes - 2001.8 m and summer 1983; 11 holes - 2670.5 m) (See Figs. 6-9 to 6-11).

TABLE 6-4: 1982 SUMMER WORK PNC EXPLORATION (CANADA) LTD. - NONACHO BASIN

1. Geological Survey	
Reconnaisance	68.3 km^2
Detailed	40.7 km^2
Detailed Grid/Mini Grid	16.3 km^2
2. Prospecting	
3. Heliborne Radiometric Survey	730 line kms
4. Ground Geophysical Survey	
VLF-EM	60 line kms
Total Field Magnetics	68.4 line kms
5. Track Etch Survey	337 cups
6. Soil Sampling	373 samples
7. Rock Chip/Core Sample Assay	706
Rock Chip (U, Th, Cu, Pb, Zn, Fe)	168
Core Samples	527
8. Thin Sections	184
9. Trenching (14 sites)	59 m^3
10. Drilling (25 holes)	
KULT 13, KULT 51	3064.4 m
11. Claim Staking	
8 claims (KULT 74-81)	62.3 km^2
(Total claims held - 81 claims)	616.35 km^2

For convenience the following descriptions of individual claim groups are classified into four geographic sub-areas: A) MacInnis Lake - Tronka Chua Lake, B) Thekulthili Lake, C) Salkeld Lake - Hjalmar Lake, and D) Sparks Lake - Naskethy Lake (Figure 6-9).

Several of the KULT claims have lapsed.

A) MACINNIS LAKE - TRONKA CHUA LAKE

KULT 11 and 14: 61°17'N,110°12'W
75 E/8

KULT 11 and 14 are east and south of the south end of MacInnis Lake and cover part of the western Nonacho-basement contact (Henderson, 1939a). Gandhi and Prasad (1980) described the Kult and Pyramid showings on KULT 11 and KULT 14 (Fig. 6-10) as veins in basement rocks. The 1980 work on these claims consisted of detailed geologic mapping and radiometrics, rock geochemistry, trenching and sampling.

Finely disseminated pitchblende, secondary uranium and copper sulphide minerals are present in quartz-rich mylonite discovered in KULT 11 in 1979. A second radioactive area with uranium-staining lies 75 metres to the northwest in a silicified zone at a

TABLE 6-5: 1983 SUMMER WORK PNC EXPLORATION (CANADA) LTD. - NONACHO BASIN

1. Geological Survey	
Reconnaissance	37.6 km^2
Detailed	31.2 km^2
Detailed Grid/Mini Grid	8.3 km^2
2. Ground Geophysical Survey	
VLF-EM	105.6 line km
Magnetics	35.5 line km
3. Radon Survey	
Track Etch Cup	259 cups
Emanometer RD 200	249 spots
4. Soil Sampling	
Soil	170 samples
Lake Sediment	42 samples
5. Trenching (10 Sites)	66.42 m^3
6. Drilling (22 Holes)	3,817.9 m
KULT 13 Area (11 holes)	1,145.2 m
KULT 49-52 Area (11 holes)	2,672.7 m
7. Rock Chip/Core Sample Assay - (U, Th)	
Rock Chips	249 samples
8. Thin Sections	98 samples
9. Claim Staking	
1 Claim (KULT 82)	6.3 km^2
Total claims held: 65 claims	470.79 km^2

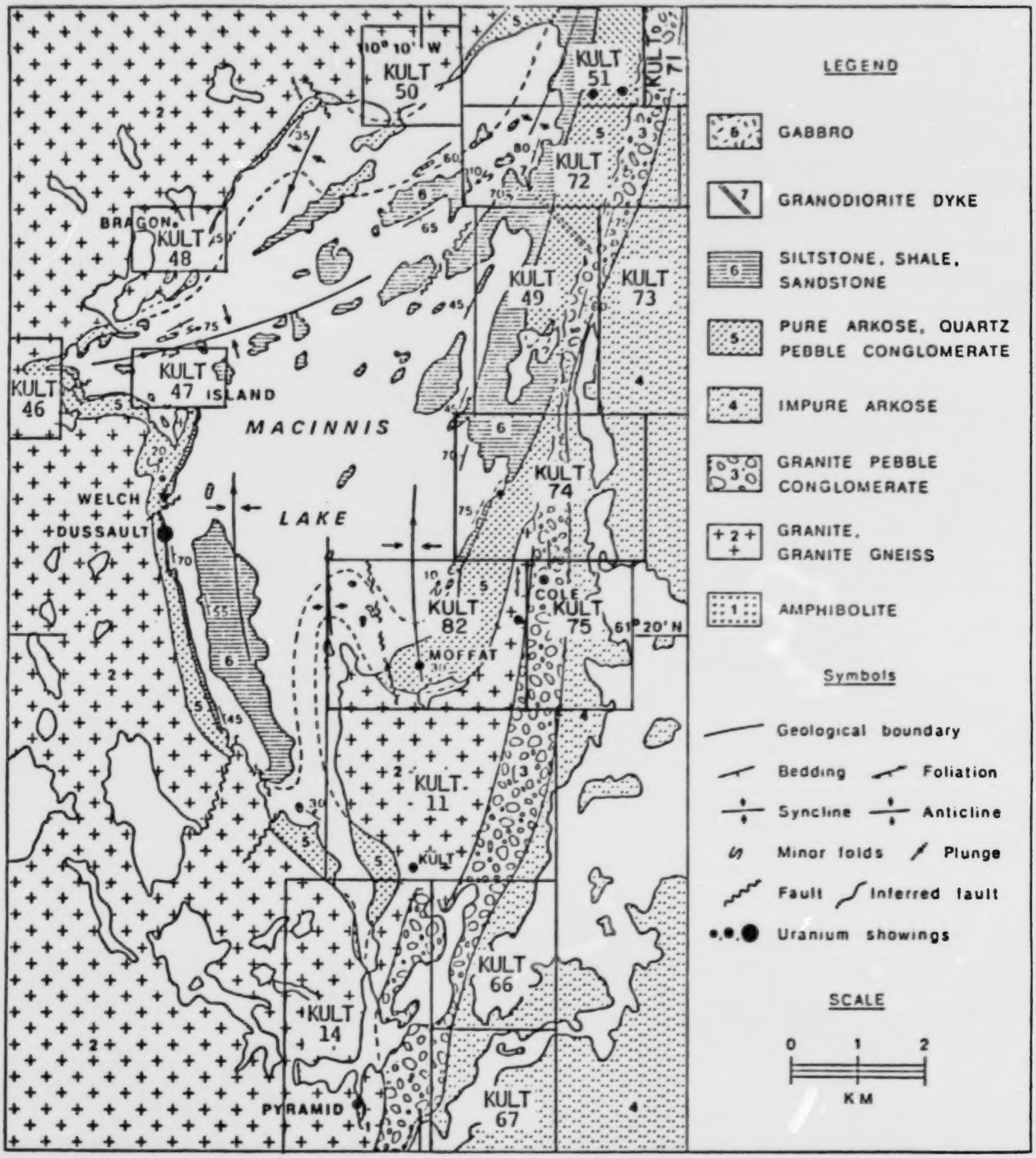

110° 10' W
61° 20' N
KULT 50
KULT 51
KULT 71
KULT 72
KULT 48
BRAGON
KULT 49
KULT 73
KULT 47
ISLAND
KULT 46
MACINNIS
LAKE
WELCH
DUSSAULT
KULT 74
KULT 82
COLE
KULT 75
MOFFAT
KULT 11
KULT
KULT 66
KULT 14
KULT 67
PYRAMID
LEGEND
GABBRO
GRANODIORITE DYKE
SILTSTONE, SHALE, SANDSTONE
PURE ARKOSE, QUARTZ PEBBLE CONGLOMERATE
IMPURE ARKOSE
GRANITE PEBBLE CONGLOMERATE
GRANITE, GRANITE GNEISS
AMPHIBOLITE
Symbols
Geological boundary
Bedding
Foliation
Syncline
Anticline
Minor folds
Plunge
Fault
Inferred fault
Uranium showings
SCALE
0
1
2
KM

FIGURE 6-10: Geology and uranium occurrences of the MacInnis Lake area, District of Mackenzie (from Gandhi and Prasad, 1980).

dyke contact.

KULT 14 includes the Pyramid showing (Gandhi and Prasad, 1980; Thorpe, 1972), which was drilled and trenched in 1967 by Territorial Uranium Mines Ltd. Pitchblende and secondary yellow and green alteration products occur as veins in fractures and disseminations in a wide chlorite-rich shear zone (amphibolite?).

In 1982 trenching and prospecting were done on KULT 11 and 14. This work was concentrated in areas of copper-uranium-rich fractures found in silicified zones associated with altered areas of northwest-trending andesitic dykes.

KULT 46-48:

61°23'N,110°15'W
75 E/8

These claims are adjacent to the western shore of MacInnis Lake (Fig. 6-10), which also corresponds to the western margin of the main part of the Nonacho Basin. The claims are separated and partly enveloped by a group of leased claims owned by Scurry-Rainbow Oil Ltd., where drilling has outlined a zone estimated to contain 27,000 tonnes averaging 0.17% uranium (Gandhi and Prasad, 1980).

Uranium showings on KULT 47 (Island showing) and KULT 48 (Bragon showing) were extensively explored by Canadian Mining and Smelting Co. Ltd. in the late 1950's. Both areas contain a number of uranium showings related to veins and fractures in sheared and altered (chloritized) gabbroic instrusions (Gandhi and Prasad, 1980).

In 1982, 21 soil samples were collected from KULT 48 to determine the source of three anomalous lake sediment samples collected in 1981. It was concluded that the source of the uranium in the lake-sediment samples is to the north.

KULT 49-53, 70-73:

60°23'N,110°08'W
75 E/8

KULT 49 and 51 are adjacent to northeast MacInnis Lake (Fig. 6-9 & 6-10). The area is underlain by middle to late Aphebian Nonacho Group sediments near the western edge of the Nonacho Basin. The basement beneath the Nonacho Group is mylonitized and cut by two small dykes of altered diorite. A major north-northeast-trending fault has been inferred along the western contact of a conglomerate bed (Fig. 6-10).

This area was included in a fixed-wing airborne geophysical survey including magnetometer, EM and radiometrics which was conducted in the spring of 1980. The results prompted the staking of mineral claims KULT 49-53 in the summer of 1980. During 1981 these claims were geologically mapped and prospected on a regional basis. A heliborne radiometric survey was conducted and one trench was blasted on KULT 51. Mineral claims KULT 70-73 were staked in 1981, towards the end of the field season after favourable results were obtained from KULT 51 and 49.

Uranium was detected at surface in oligomictic conglomerate, quartz pebble sandstone, argillites and arkosic sandstone. Two types of showings occur in oligomictic conglomerate: a disseminated stratabound type and a fracture filling type. Several zones of disseminated uranium minerals were found on eastern KULT 49 and along the KULT 51-KULT 71 boundary during the 1981 and 1982 field seasons. Uranium minerals are not visible, but seem to be disseminated throughout the matrix of sheared conglomerate. The radioactive zones parallel the strike and dip of the foliation and are about the same distance east of the major NNE fault. Fracturing is common, but lithologic controls cannot be recognized. Pyrite is common in radioactive as well as non-radioactive zones. All of the surface showings are low grade. The maximum assay obtained was 0.13% U_3O_8 from a chip sample.

The second type of conglomerate-hosted anomaly is a fracture-filling type. Pitchblende, yellow secondary uranium oxides and galena are readily observed along fractures. Examples were identified in southern KULT 51, eastern KULT 52 and the Cole showing south of KULT 49 (Fig. 6-10).

In 1982 MPH Consulting Ltd. was contracted to do line cutting and magnetometer, vertical gradiometer and VLF EM surveys of a grid that trends north-northeast from southeast KULT 49 to northeast KULT 53. MPH Consulting Ltd. also did a heliborne radiometric survey of the entire block of claims. PNC Exploration (Canada) Ltd. staff did mapping, radiometric prospecting, and radon (Track Etch) and soil geochemical surveys of the gridded area. Several trenches and four drill holes (700 m) in southeast KULT 51 completed the 1982 program.

In the spring of 1983, an additional seven holes (2001.8 m) were drilled in the same area to test for uranium. Targets included the sub-Nonacho Group unconformity, a magnetic anomaly, a VLF EM conductor, the junction of faults, and extensions of radioactive zones. Several holes intersected a zone of anomalous radioactivity.

During the summer of 1983, geological, geophysical and geochemical surveys as well as trenching and radon surveys were carried out north of the 1982 grid area. An additional 11 holes (2,670.5 m) were drilled in southeastern KULT 49 and 51, but the results were generally disappointing.

KULT 66 and 67

61°17'N,110°09'W
75 E/8

The claims lie 2 km east of the southern end of MacInnis Lake (Fig. 6-9). KULT 66 and 67 are underlain by Nonacho Group sediments consisting of oligomictic conglomerate in the west and grading into quartzose sandstone toward the east. The Nonacho Group sediments are in fault contact with basement rocks in the northwest corner of KULT 66.

No anomalous radioactivity was associated with the basal conglomerate or andesite dykes on the claims. Radiometric readings on outcrops ranged from 75 cps (SPP2 scintillometer) on conglomerate and sandstone to 150 cps on shaley units.

KULT 70-73

61°25'N,110°05'W
75 E/8

These claims were staked in 1981 after favourable results had been obtained on the neighbouring KULT 49 and 51 claims. The area is mainly quartzose to subarkosic sandstone. No uranium minerals were found in 1982, although several low-priority radiometric anomalies were recorded.

KULT 80 and 81:

61°30'N,110°W
75 E/5,8,9,12

The KULT 80 and 81 claims are on the west side of Tronka Chua Lake, 10-20 km north of KULT 70 and along strike with the major fault and anomalous zones found on KULT 49 and 51. Zones of mylonite are common in the basement gneisses that underly the northwestern half of the claims. The basement-Nonacho Group contact is a fault surface.

Prospecting identified 21 radioactive anomalies, all but one in basement rocks. Follow-up Track Etch, soil geochemistry and VLF-EM surveys failed to establish any continuity to the showings or indicate additional target areas.

KULT 74,75,82:

(1983)

61°20'N,110°10'W
75 E/8

The claims are on the western margin of the main body of Nonacho Group sediments. The southeast shore of MacInnis Lake runs through the western part of the area.

Uranium showings in the claim area have been divided into four types based on their host rock and mode of occurrence as follows:

1) Showings that occur as stockwork systems of veins in N-S trending mylonite zones.
2) Showings that occur as stockwork-like veins in basal oligomictic conglomerate (Cole Prospect, see Figure 6-10 and Gandhi and Prasad, 1980).
3) Sporadic uranium minerals in fractures or disseminated within basement rocks.
4) Low-grade showings associated with dark, heavy mineral layers in the quartz pebble sandstone unit of the Nonacho Group (Moffat Showing).

Type 3 and 4 anomalies are not considered primary targets in this area because they occur sporadically, lack continuity and are generally low grade.

Numerous type 1 anomalies have been mapped in the mylonite. The host rock is mylonite exhibiting various stages of cataclasis and relicts of psammitic gneiss. Pitchblende is present in northerly to north-northeasterly trending, vertical to sub-vertical veins. Associated minerals in decreasing order of abundance are chlorite, hematite, calcite, pyrite, arsenopyrite and malachite.

The Cole prospect in oligomictic conglomerate of northwestern-most KULT 75 is a type-2 deposit. It was formerly known as the BM claims (Gibbins and others, 1977, p. 75 and Gandhi and Prasad, 1980).

Pitchblende and secondary yellow uranium minerals are found in fractures and are closely associated with calcite and to a lesser extent with hematite. Gold is associated with the uranium (Shell Canada Resources Ltd. - DIAND assessment report 080170).

An integrated geological, geophysical (magnetics, VLF EM and radiometric) and geochemical (Track Etch, soil samples and radon gas) program was carried out in 1983.

B) THEKULTHILI LAKE

KULT 13, 23 and 24: 60°55'N,109°58'W
75 C/16

The KULT 13, 23 and 24 claims are immediately west of the southeasternmost tip of Thekulthili Lake (Fig. 6-9). This area contains Nonacho Group sandstone, narrow andesite dykes, mylonite and basement granite, diorite and paragneisses (Fig. 6-11).

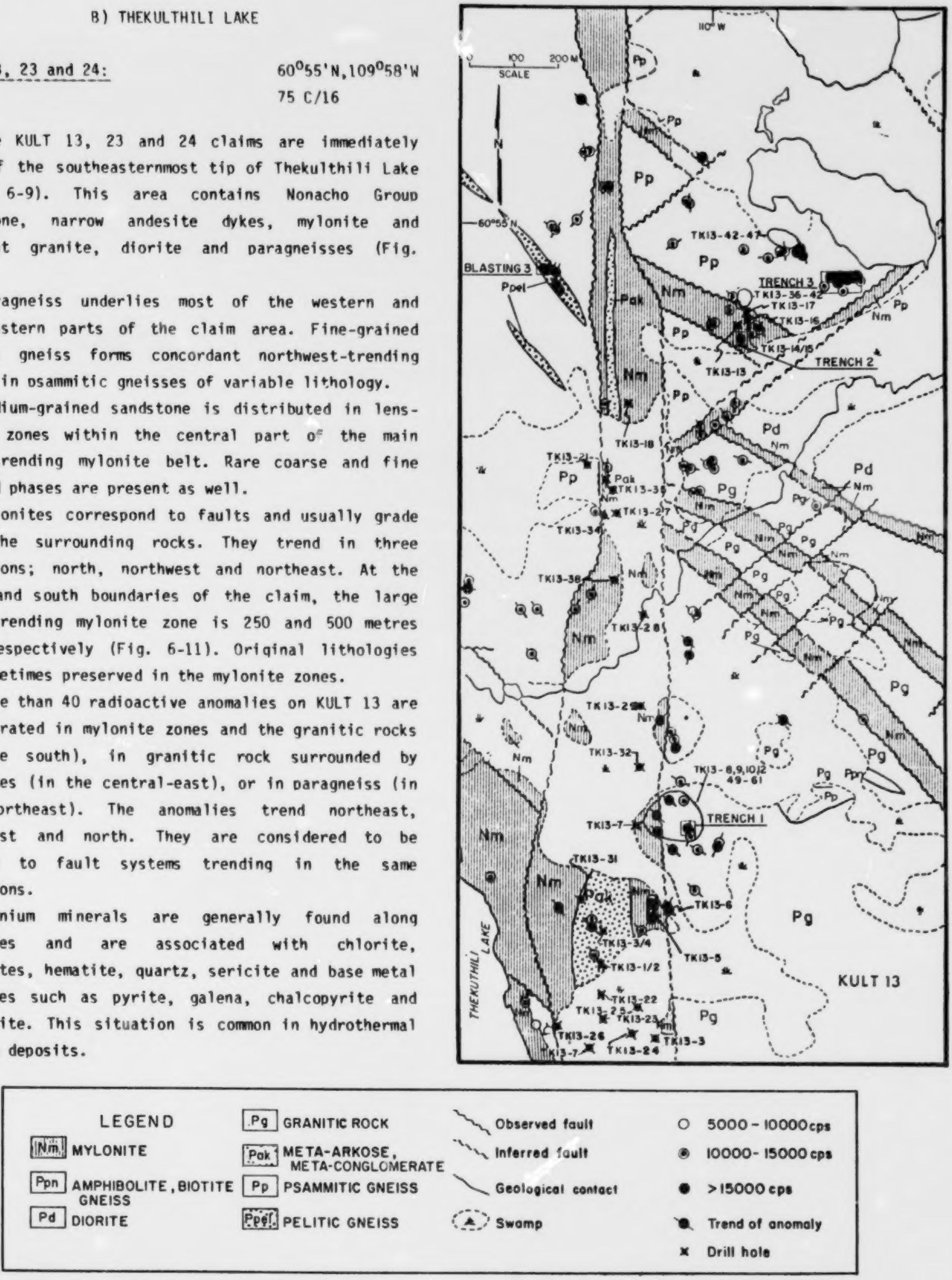
Paragneiss underlies most of the western and northeastern parts of the claim area. Fine-grained pelitic gneiss forms concordant northwest-trending lenses in psammitic gneisses of variable lithology.

Medium-grained sandstone is distributed in lens-shaped zones within the central part of the main north-trending mylonite belt. Rare coarse and fine grained phases are present as well.

Mylonites correspond to faults and usually grade into the surrounding rocks. They trend in three directions; north, northwest and northeast. At the north and south boundaries of the claim, the large north-trending mylonite zone is 250 and 500 metres wide respectively (Fig. 6-11). Original lithologies are sometimes preserved in the mylonite zones.

More than 40 radioactive anomalies on KULT 13 are concentrated in mylonite zones and the granitic rocks (in the south), in granitic rock surrounded by mylonites (in the central-east), or in paragneiss (in the northeast). The anomalies trend northeast, northwest and north. They are considered to be related to fault systems trending in the same directions.

Uranium minerals are generally found along fractures and are associated with chlorite, carbonates, hematite, quartz, sericite and base metal sulphides such as pyrite, galena, chalcopyrite and sphalerite. This situation is common in hydrothermal uranium deposits.


110° W
0 100 200 M
SCALE
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60°55' N
BLASTING 3
Ppel
Pp
Pak
Nm
Pd
Pg
TK13-42-47
TRENCH 3
TK13-36-42
TK13-17
TK13-16
TK13-14/15
TK13-13
TRENCH 2
TK13-18
TK13-21
TK13-39
TK13-27
TK13-34
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TK13-8,9,10,12 49-61
TRENCH I
TK13-7
TK13-31
TK13-6
TK13-3/4
TK13-1/2
TK13-5
TK13-22
TK13-25
TK13-23
TK13-26
TK13-7
TK13-24
TK13-3
THEKUTHILI LAKE
KULT 13
LEGEND
Nm MYLONITE
Ppn AMPHIBOLITE, BIOTITE GNEISS
Pd DIORITE
Pg GRANITIC ROCK
Pak META-ARKOSE, META-CONGLOMERATE
Pp PSAMMITIC GNEISS
Ppel PELITIC GNEISS
Observed fault
Inferred fault
Geological contact
Swamp
○ 5000 - 10000 cps
◉ 10000 - 15000 cps
● >15000 cps
Trend of anomaly
✱ Drill hole

FIGURE 6-11: Geology and drill hole localities, KULT-13 claim.

Eight of the main mineralized areas were surveyed, trenched and blasted in 1980-1981 and twenty holes (2,942 m) were drilled and probed in 1981.

In the spring of 1982, nine holes (1,821.5 m) were drilled on KULT 13 (6 holes, TK 13-24 to TK 13-29, Fig. 6-11) and adjacent northernmost KULT 17 (3 holes, TK 17-1 to TK 17-3). The target of all holes, except TK 13-26, was the meta-arkose unit (Pak) within the north-trending mylonite zone in central KULT 13 and 17, (see Fig. 6-11).

The arkosic sandstone found in the mylonite zone is massive and mainly medium to coarse grained. It contains poorly sorted quartz and red clast granules. Pebble-bearing layers are often encountered. The unit is in fault contact with the surrounding mylonite. It appears to pinch out south of hole TK 13-23 and not extend into KULT 17, as was previously thought. Up to 240 ppm uranium was encountered in arkose in holes TK 13-27 and TK 13-28, but not in adjacent holes. Up to 950 ppm uranium was also detected in the mylonite that forms the footwall of the arkose in TK 13-27. There are a large number of radiometric anomalies in the footwall mylonite which are partly associated with base metal sulphides such as galena, sphalerite, chalcopyrite and pyrite, (DIAND assessment report 081564).

During the 1982 and 1983 field seasons, exploration in the KULT 13 area consisted of detailed grid mapping, trenching (about 6 cubic meters), geophysics (magnetometer - 1982, VLF EM - 1983) and drilling (21 holes - 2,358.7 m in 1982 and 11 holes - 1,145.2 m in 1983). In 1982, trenches were made in the extension of a uraniferous andesite dyke and a radioactive fracture in the dyke, and a radioactive fracture in mylonitized psammitic gneiss on KULT 23 and 24 respectively. The latter proved to be the more interesting with fracture fillings of pyrite and calcite, traces of pitchblende, chalcopyrite, galena and secondary uranium minerals. The magnetometer survey outlined an andesite dyke in KULT 13, but failed to show another andesite dyke in KULT 23. The VLF-EM survey conductors defined a zone of extreme granulation with the mylonite zones, as well as cross-cutting structures. A radon survey indicated anomalies that correspond with and confirm a 1980 Track Etch survey.

Results of the 1982 and 1983 drilling are confidential until 1986-1987 under provisions of the Canada Mining Regulations.

KULT 17, 60-62: $60^{\circ}52'$N,$109^{\circ}59'$W
75 C/13

These claims are 5 to 10 km southeast of the southeast corner of Thekulthili Lake (Fig. 6-9). The KULT 60-61 claims were staked in July,1981 and the 1982 exploration consisted of geological and radiometric mapping (KULT 60-61) and soil sampling and Track Etch surveys (KULT 17 and 62).

Only 3 of 33 radiometric anomalies are in mylonite, with the best one registering up to 5,000 cps and assaying up to 0.056% U_3O_8 and 0.011% ThO_2. Most of the remaining anomalies are in local pegmatites and psammitic gneiss.

KULT 63 and 64: 61°N,$110^{\circ}07'$W
75 D/16

KULT 63 and 64 are in the Bigpine Narrows area of southern Thekulthili Lake. The claims cover mainly polymictic conglomerate of the Nonacho Group. The 1982 ground and airborne prospecting and radiometric surveys did not produce any significant anomalies.

KULT 65: $61^{\circ}06'$N,$110^{\circ}18.5'$W
75 E/1

KULT 65 is centered on Jerome Lake and is underlain by relatively uniform quartzose sediments trending north-northwest and dipping steeply to the east-northeast. The 1982 surveys failed to reveal any anomalous radioactivity in the claim area.

KULT 68 and 69: $61^{\circ}10'$N,110°W
75 F/4

KULT 68 and 69 are near the east shore of Thekulthili Lake. Archean basement rocks are exposed in the eastern half of KULT 68 and Nonacho Group sediments are exposed in the west and on KULT 69. The contact between the basement and Nonacho supracrustal rocks is generally covered by the lake. The basement rocks on KULT 68 are psammitic gneiss, hornblende gneiss, amphibolite and mylonite. Oligomictic conglomerate of the Nonacho Group is in fault contact with basement amphibolite and hornblende gneiss and conformably overlain by quartzose sandstone. Uranium anomalies were found in the three principal basement lithologies, in fractures along and on either side of an andesite dyke-conglomerate contact, and with thorium-rich, red-coloured volcanic clasts in conglomerate. However, the majority of the radiometric anomalies are near the amphibolite-paragneiss contact.

KULT 79: 61°10'N,109°52'W
(1983) 75 F/4

KULT 79 was staked in 1982 to protect an anomalous zone discovered during a heliborne spectrometer survey. About 70 anomalies, clustered in three main zones, were found in psammitic gneiss and hornblende gneiss. Pitchblende and yellow uranium oxides are present with calcite and hematite filling fractures. However, all of the anomalies lack size and continuity.

C) SALKELD LAKE-HJALMAR LAKE

KULT 35: 61°23'N,109°40'W
75 F/5

KULT 35 is about 8 km east of Salkeld Lake. A fault-contact cuts east-west across the center of the claim, separating basement rocks to the south from Nonacho Group sandstone to the north. In 1981, two small thorium-rich radioactive zones were found to be associated with biotite in pegmatitic facies of basement paragneiss. Other anomalies were found in the Nonacho Group, but they are small and discontinuous.

KULT 59, 76-78: 61°23'N,109°39'W
75 F/5

KULT 59 and the adjoining KULT 76-78 claims are between Salkeld and Hjalmar lakes in the northern part of the project area (Fig. 6-9). All but the northernmost strip of KULT 76 are underlain by paragneiss, granite gneiss and other granitic rocks of the basement complex. A cataclastic zone is related to faulting in the west part of KULT 59.

A 1980 airborne survey identified numerous radiometric anomalies in the area of KULT 59. Subsequent ground surveys over some 4.3 km of grid lines outlined three areas of interest with count rates from 19,500 to 28,000 cps. These zones were trenched in 1981.

Numerous radiometric anomalies were identified on KULT 59, mainly in the southwest corner of the claim. They are distributed in several zones within 500 metres of a major north-northwest-trending fault and/or adjacent east-northeast-trending structures, mainly on the east side of the fault. Uranium, present as pitchblende in narrow fractures in paragneiss, prompted the staking of the KULT 76-78 claims and the establishment of a detailed grid in the area as a base to identify lithological, geochemical and structural controls. Work included geological mapping at 1.2,500 scale, a radiometric survey, 15 line-km of total field magnetics and VLF EM (Cutler and Seattle Stations), a 57-sample Track Etch survey and a 56-sample geochemical soil survey. Rock samples were collected and used to prepare 66 petrographic reports or descriptions, and 93 geochemical rock chip assays.

In 1983, the KULT 76-78 claims were prospected and mapped and several new trenches were excavated in the anomalous southwest area of KULT 59.

D) SPARKS LAKE - NASKETHEY LAKE

KULT 40-41: 61°21'N, 109°32'W
75 F/5

The claims are at the west end of Naskethey Lake, where the basement-Nonacho Group contact runs diagonally northeasterly through the area (Fig. 6-9). This contact is in part an unconformity and in part a fault. Basement rocks in the northwest are altered paragneisses, granodiorite gneisses, quartz monzonite gneisses and meta-intrusives. Nonacho Group sediments to the southeast are mainly quartzose sandstone and arkose with minor shale and conglomerate. Radioactivity is associated with several heavy mineral layers in the arkose on an island in the west part of KULT 40.

Reconnaissance mapping and prospecting in 1982 led PNC Exploration (Canada) Ltd. to focus on a small area with several radioactive anomalies in the northwest corner of KULT 41 (Fig. 6-9). Several anomalies lie along a northeast trend which correlates with a mylonite zone that parallels the basement- Nonacho Group contact. Trench 83-41 was stripped and blasted in this zone. Results of the trenching are presently confidential.

KULT 45: 61°16'N,109°28'W
75 F/6

The westernmost third of KULT 45 includes the northwesternmost part of Sparks Lake, including the eastern two thirds of a large island known as Three Kilometre Island to PNC exploration staff.

Basement rocks on the mainland include amphibolite (metavolcanic) and granite, however, on Three Kilometre Island, only granite basement is present along with arkose and argillite of the

Nonacho Group and dyke rocks. These dyke rocks include: a large basic dyke of coarse to fine grained gabbro-diorite, younger granitic dykes containing xenoliths of arkose and a younger basic (diorite) dyke.

Uranium minerals and anomalous radioactivity on KULT 45 are restricted to the 100 by 500-metre area of the basic dyke on the southeast corner of Three Kilometre Island.

Geophysical surveys (magnetic, VLF EM and HLEM) done in 1982 do not show any correlation to uranium minerals. Only total field magnetic data were useful in outlining geologic contacts.

OTHER CHURCHILL PROVINCE

The geology of the Churchill Province in the District of Mackenzie is known principally from the results of reconnaissance mapping. Summaries of the geology of the Churchill Province have been prepared by McGlynn (1970b) and Davidson (1972b). Only recently has more detailed work become available for parts of the region, (Aspler, in preparation; Bostock, 1982; Culshaw, 1984).

Fraser (1978, p. 195) summarized the metamorphism in the area as follows:

> The northwestern Churchill Province is underlain mainly by quartzofeldspathic gneiss and subordinate metavolcanic and metasedimentary rocks of Archean age which have been metamorphosed to amphibolite and granulite facies.Metamorphism to amphibolite facies probably took place during the Kenoran Orogeny. Metamorphism to granulite facies, characterized in the north by biotite-hornblende-hypersthene assemblages and in the southwest by garnet-cordierite-sillimanite-spinel assemblages, is possibly pre-Kenoran. Early to mid-Aphebian, greenschist to lower amphibolite facies metamorphism recognized in Aphebian strata at Great Slave Lake, may elsewhere overprint amphibolite and granulite facies rocks.

SNO 1-5

Golden Rule Resources Ltd. Gold
150, 1300 - 8th Ave. S.W. 65 D/2,3,7,16
Calgary, Alta., T2R 1B2

REFERENCES

Eade (1981a); Gibbins (1984); Laporte (1974b); Ridler and Shilts (1974); Schiller (1965); Taylor (1963).

DIAND assessment reports 081715 and 081717.

PROPERTY

SNO 1-2; SNO 3-4; SNO 5.

LOCATION

The claims are all in the Snowbird Lake area in the southeast corner of the District of Mackenzie almost midway between Yellowknife (650 km to the west-northwest) and Churchill, Manitoba (550 km to the east-southeast). The SNO 1 and 2 claims (60°54'N, 102°27'W) are 12 km east of the north end of Snowbird Lake (Fig. 6-1). SNO 3 and 4 (60°03'N, 103°18'W) are 15 km south of the southwest corner at Atzinging Lake and 5-7 km north of the southern boundary of the Northwest Territories and SNO 5 is 5 to 6 km east of the geographic center of Bourassa Lake. The area lies at the southwest end of the Ennadai Lake-Rankin Inlet Volcanic Belt (Ridler and Shilts, 1974).

HISTORY

The SNO 1-2 claims include a high-grade gold showing formerly staked and explored as the COP claims in 1969 and 1964. Schiller (1965, p. 14-16) reports the best assay was 169.3 g/t of gold and 132.3 g/t silver over a width of 0.5 m. Mineral rights to the area (65 D/16) were held by Gulf Minerals Canada Ltd. under Prospecting Permit 448 during 1977-1979 as part of their Ennadai Lake project (Laporte, 1981, p. 35-36), but little or no detailed prospecting or mapping was done on the permit area.

SNO 3 and 4 include a showing, referred to as the 'N occurrence', discovered by Canadian Homestead Oils Ltd. in 1971 and 1972 in Prospecting Permit 138 (Laporte, 1974b, p. 3-4). Canadian Homestead Oils Ltd. had airborne EM, magnetic and radiometric surveys flown and contracted ground follow-up that led to the discovery of the N occurrence. The property was then optioned to Imperial Oil Ltd., who enlarged the grid and did geophysical and soil geochemical surveys. The soil geochemistry results were not encouraging and none of the conductors were drill-tested.

There is no record of previous work at the SNO 5 claim, but it is partly in 65 D/7 granted to Canadian Homestead Oil Ltd. in 1971-1972 as Prospecting Permit 140.

The SNO 1-5 claims were staked in the fall of 1981.

In 1981 a regional lake-sediment sampling program obtained 245 samples that were analyzed for copper, lead, zinc, nickel, silver, gold and arsenic. The density was not great enough to properly define their geographical distribution and geological significance. At the same time, previously discovered mineral showings were revisited and sampled. On the SNO 1 and 2 claims, gold was found to be associated with late structures and quartz veining. The N occurrence on the SNO 3 and 4 was visited and sampled. The SNO 5 claim contains iron formation that was sampled for gold (Gibbins, 1984).

DESCRIPTION

All of the SNO claims contain Archean sediments and volcanics of the Ennadai Lake-Rankin Inlet Belt (Ridler and Shilts, 1974 ; Eade, 1981a). Taylor (1963) described the volcanics as mostly basalt flows, but including tuffs, laminated metavolcanics and hornblende-feldspar gneiss and interbedded greywacke. Most of the basalt is massive, but some flows display poorly developed pillows; others show scoriaceous tops and flow top breccias. The sedimentary rocks consist of greywacke and quartzite. Most of the greywacke shows a well-developed fine lamination, but massive units are found as well. The quartzites are not as extensive and usually contain cross-bedding or graded bedding.

CURRENT WORK AND RESULTS

In 1983 detailed work on the SNO 1 and 2 claims resulted in the discovery of a fourth mineral showing called Cop #4, in the north-central part of SNO 1. It is similar to other showings and is related to a shear-vein system with varying amounts of quartz and various sulphide minerals. A grab sample of shear and vein material (R-8-19-5) assayed 32.4 ppm gold and a sample of galena-rich rock (R-8-19-3) contained 11.3% lead and 280 ppm silver. A number of outcrops of sulphide, magnetite and silicate facies iron formation were discovered in the vicinity of the claims, but significant gold assays were not obtained. Geological observations indicate that the regional mapping (Taylor, 1963) is simplified but generally correct.

The N showing on SNO 3 was trenched to expose probable frost-heaved blocks. Sulphides in quartzites and graphitic schists of 'probable tuffaceous origin' consist mainly of disseminated pyrrhotite and/or pyrite. A number of sulphide-bearing boulders were discovered and examined in the vicinity of SNO 3 and 4. Elevated levels of silver and copper and some minor enrichment of gold are evident along the contact between metavolcanic and metasedimentary rocks.

Samples of sulphide-bearing mafic volcanics collected near an arsenic lake-sediment anomaly on the SNO 5 claim have low gold, silver and copper contents.

An air photo interpretation of the claim areas indicated a number of lineaments related to glacial and bedrock trends as well as mineralized contacts and structures.

LEA 1-20

Lloyd Anderson and William Kizan	Copper,Nickel
c/o Snowdrift Enterprises Ltd.	75 E/10
Snowdrift, NWT	61°37'N,110°47'W

REFERENCES

Culshaw (1984a, b); Henderson (1939).

DIAND assessment report 081712.

PROPERTY

LEA 1-20

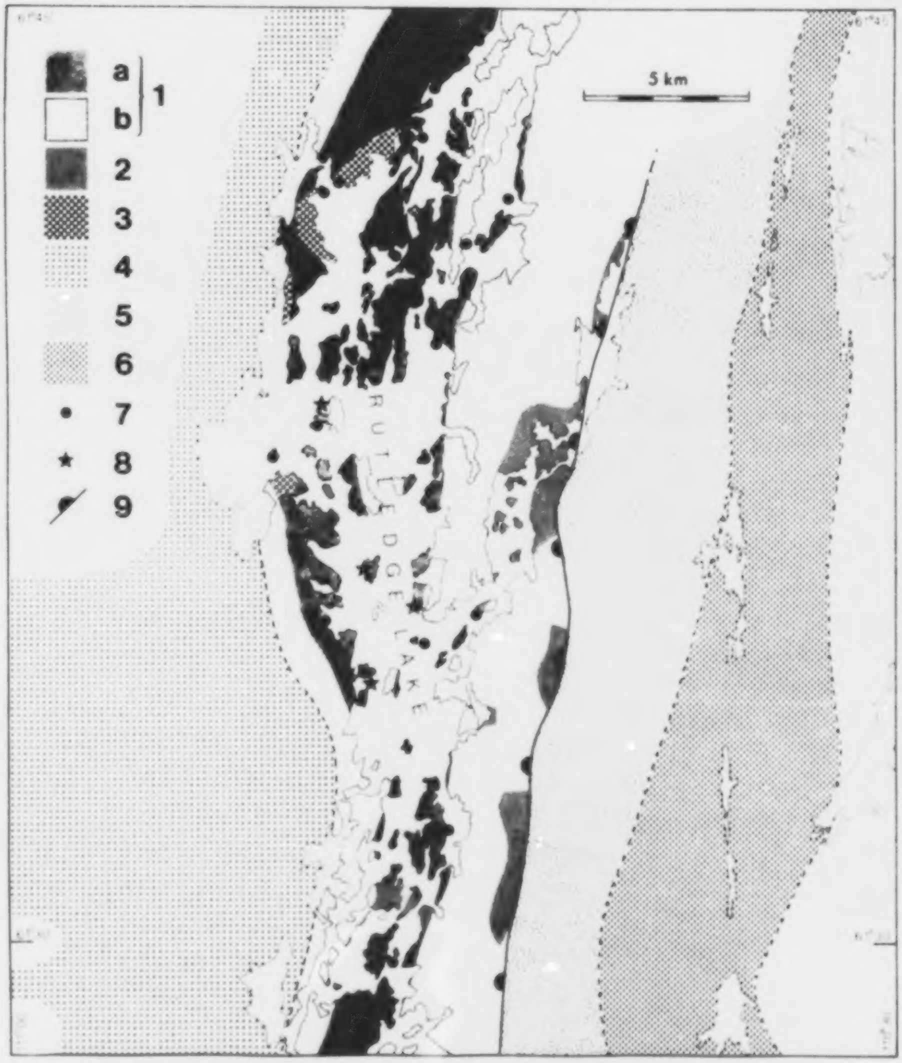
LOCATION

The claims are centered on and include most of Rutledge Lake and adjacent shorelines. Rutledge Lake is about 200 km southeast of Yellowknife and 180 km north-northeast of Fort Smith (Fig. 6-1).

HISTORY

Mr. W.W. Kizan and Mr. Lloyd Anderson first prospected at Rutledge Lake in 1980 after having sighted gossans from the air during flights across the lake. In late 1980 Mr. Kizan brought rock and mineral specimens to Trigg Woollett Consulting Ltd.'s office, where they were determined to be of volcanic origin, and because the mineral specimens contained layered sulphides, it was surmised that the deposits from which they were derived may have been formed under volcanic conditions.

In September,1981 Trigg Woollett Consulting Ltd. geologists spent several days in the Rutledge Lake area trying to define the margins of the volcanic belt. This mapping defined a belt of metatuff of intermediate composition which was determined to be at least 59 km long and which tapered rapidly at the north and south ends. The maximum width of the intermediate tuff belt is 17.5 km. More than 70 gossans and 41 sulphide mineral showings were identified during the reconnaissance mapping; about 75% of these are within the belt of intermediate metatuff. Only three of the sulphide showings were examined in detail. The LEA 1-20 claims were staked in the fall of 1981.



1. *Rutledge Lake complex, interlayered granite gneiss and paragneiss; 1a, dominant paragneiss; 1b, dominant granite gneiss.*
2. *Mama Moose complex, paragneiss and metabasite.*
3. *Charnockitic gneiss.*
4. *S-type granite, weakly foliated.*
5. *Eastern granite, gneissic megacrystic granite and pink leucogranite with metabasite enclaves.*
6. *Mylonites of granitoid protolith.*
7. *Small mafic and ultramafic bodies.*
8. *Cu mineralization (associated with unit 7).*
9. *Hypersthene-out, hornblende-in isograd; teeth on high grade side.*

FIGURE 6-12: Geology of the Rutledge Lake area (from Culshaw, 1984a). The boundary between units 1 and 4 is gradational. The boundaries of unit 6 were derived by air photo interpretation

DESCRIPTION

R.A. Olson and D.J. Pawliuk of Trigg Woolett Consulting Ltd. describe the geology of the area as follows:

> Rutledge Lake area is predominantly underlain by metamorphosed equivalents of volcanic tuffs of felsic to intermediate composition. In general, quartz-rich felsic metatuffs underlie a series of northerly trending ridges, whereas intermediate-to basic-metatuffs or other volcanic rocks underlie lake- and muskeg-covered areas. The felsic to intermediate volcanic rocks are locally interbanded at contacts between the units. Granitic and gneissic rocks are present at a few locales near Rutledge Lake.

Culshaw (1984a, b and Fig. 6-12) recently mapped the area at a scale of 1:30,000, but only reconnaissance mapping by Henderson (1939a) published at 1:250,000 was available at the time of discovery and the Trigg Woollett Consulting Ltd. work. The Henderson map shows the area to be underlain by granitic rock, however, aeromagnetic maps (GSC map 1566A, 1637G and 1638G) indicate more complex geology.

Culshaw (1984a, b) mapped and defined the Rutledge Lake complex as follows:

> It is composed of four types of granitoid gneiss, three types of supracrustal gneiss and associated minor metabasite bodies, all steeply dipping and interlayered on all scales. This gneiss belt is situated on the boundary between north-south trending positive and negative magnetic anomalies.

To the south this boundary is coincident with a belt of highly deformed gneisses, which includes mylonites. At their northern end the anomalies curve northeastward into the wide positive magnetic anomaly marking the Slave-Chantrey Mylonite Zone.

The paragneiss component of the Rutledge Lake complex has a range of compositions characterized by three end members: a migmatitic pelitic gneiss containing garnet, sillimanite, cordierite and spinel; a quartzite with minor pelitic horizons; and a quartz-feldspar metawacke. These gneiss types are interlayered on a centimetre to a decametre scale. The granite component of the complex is predominantly a pale buff, pink or white weathering leucocratic gneiss of granite to granodiorite composition.

The Mama Moose complex (unit 2, of Culshaw, 1984a, Fig. 6-12) is outlined on the aeromagnetic maps by prominent positive anomalies. It has paragneiss and metabasic components. The metabasite forms thick (50-200 m), steeply dipping continuous layers within the predominant paragneiss. Unlike the paragneiss of the Rutledge Lake complex, these rocks are not generally intimately interlayered with granite.

The terrain to the west of the lake is underlain by a medium grained, weakly foliated, pale pink granite (unit 4, Fig. 6-12), probably a less deformed equivalent of the granite component of the Rutledge Lake complex. Megacrystic granite has only been recognized during reconnaissance in the extreme west. Within this less deformed granite terrane are two narrow metasedimentary belts trending northeast and southwest, at a high angle to the Rutledge Lake belt. These belts, not shown in Figure 6-12, are located some 5 km from the lake, in the north-west and southwest, respectively, of the area.

The eastern granite (unit 5, Fig. 6-12) is composed of a grey, strongly deformed and recrystallized megacrystic granodiorite and a pink leucogranite. The pink granite is in many places charged with amphibolite inclusions. These rocks become more frequently cut by epidote-filled fractures closer to the belt of mylonite (unit 6, Fig. 6-12).

The (proto-) mylonites of the mylonite belt are predominantly derived from a granitic protolith. They are pink weathering, but dark and aphanitic on fresh surfaces. Many are charged with numerous feldspar porphyroclasts. Cataclasite is developed along a lineament that lies within the mylonites and is interpreted as a late fault.

Small ultramafic and mafic bodies (units 7 and 8, Fig. 6-12) are a volumetrically minor but very significant component of the gneiss belt, where they are closely associated with copper-nickel minerals. Many are only a few decimetres wide and one or two metres long, although a few of the larger bodies occupy entire outcrops. Rare pyroxene porphyroclasts and a strong tectonic fabric suggest they originated as somewhat longer bodies which were subsequently boudinaged (Culshaw, 1984a, p. 334).

Most commonly the ultramafic rocks are fine, dark green, granular and somewhat micaceous. Both ortho- and clinopyroxene display kinking and undulatory extinction and are variably altered to secondary amphibole. An assemblage of spinel-olivine-orthopyroxene-amphibole is preserved in the least altered ultramafic body, near the northernmost showing. Mafic bodies are less abundant than ultramafic bodies. They include two-pyroxene, mafic granulites of gabbroic composition. Locally they are interlayered with the ultramafic types.

Numerous narrow diabase dykes trending 140 to 160° transect the lake. They outcrop most frequently in the centre and at the northern end of the lake, clustering around two large dykes (ca. 20 m wide) which cross the lake at these locales. These appear to be entirely fresh and to postdate all except the latest faulting, and are correlated with the Sparrow Dykes (Culshaw, 1984a).

CURRENT WORK AND RESULTS

1982:

During 1982 Messrs. Kizan and Anderson continued to prospect the claims and several geologists from various mining companies and John Brophy, DIAND Staff Geologist from Yellowknife, visited and sampled the various mineral showings (Fig. 6-12). Most of these samples were grab samples that returned low but interesting assays for copper, nickel, cobalt, molybdenum, lead, gold and silver.

Trigg Woollett Consulting Ltd. recommended a four-phase exploration program consisting of airborne electromagnetic and magnetic surveys, ground geophysical follow-up of selected anomalies and detailed prospecting, mapping, trenching and drilling. Vancouver Petrographics Ltd. was commissioned to do a petrographic study of rock samples from the area. They concluded that the rocks were rhyolite metatuff and intermediate metatuff.

1983:

Airborne Geophysics

Questor Surveys Ltd. flew 2,211.5 km of Standard Mark IV INPUT-EM and magnetic survey over the Rutledge Lake area in July and August, 1983. Line spacing was 350 m and lines were flown in east and west directions. The linearity of conductive and magnetic trends and anomalies in the Rutledge Lake area is normally interpreted as an indication of a sedimentary environment. However, the large number of short strike-length conductors, detected as a result of the 1983 survey, may fit a wide range of target models including volcanic belts, fault or shear zones and graphitic units. All of the anomalies deemed significant have transient decay rates that are typically associated with a wide range of sulphide deposits. Twelve class 1, nineteen class 2 and five class 3 conductive-magnetic zones were outlined with four (43 C, 62 G, 86 B and 146 C) recommended for immediate attention. Two examples of conductive lake bottom sediments were identified, they are very distinctive and not common in the area.

Ground Follow-up

Trigg Woollett Consulting Ltd. conducted prospecting, grid line-cutting, geological mapping, VLF-EM and magnetic surveys, soil and rock chip sampling between September 28 and October 11, 1983, on five priority INPUT-EM/magnetic targets. This work showed that the airborne survey had effectively outlined sulphide mineral occurrences of similar size, mineralogy, geological setting and geophysical properties. Ground VLF-EM and magnetometer surveys were much more effective in outlining sulphides than soil geochemistry. Economic sulphide showings were not discovered.

Staking

The ENEX 1-10 mineral claims (10,096.33 ha) were recorded October 5, 1983 in the name of Enexco International Ltd. to protect INPUT conductors outside the LEA 1-20 claims.

Reinterpretation of Geophysical Programs

Paterson, Grant and Watson Ltd. was contracted to synthesize and reinterpret the 1983 geophysical work. The raw aeromagnetic data was modified to produce apparent magnetic susceptibility maps. This technique calculates the magnetic susceptibility distribution in the ground that would be required to produce a total magnetic field contour map identical to the one measured. This map not only effectively removes most of the regional gradient, but also provides a measure of the local susceptibility, which is related to the magnetic minerals of the rocks. The magnetic susceptibility map forms the basis of a new geological interpretation which has similar regional but markedly different detail than the Trigg Woollett mapping. The Paterson, Grant and Watson interpretation recognized three principal magnetic terrains, consisting of low, intermediate and high magnetic relief.

They also recognized 81 single or multiple INPUT conductors and observed that the magnetic susceptibility anomalies are confined both along strike and laterally, to the regions of highest conductivity.

Five priority ratings (A, A-, B, B- and C) were assigned to the 81 INPUT conductors to be considered along with other factors such as size, shape, geological environment and accessibility to select conductors for further work. They suggested that ground EM using horizontal loop (i.e., Max-Min) is preferable to VLF-EM, because widespread pyrrhotite will make it important to find the main axis of the airborne conductor.

Insufficient conductive material was noted during ground follow-up to account for strong INPUT anomalies, and more ground geophysical work and drilling appear to be warranted.

JT CLAIMS

Talston River Mining Ltd.	Lead, Zinc
Box 618	67°17'N,112°35'W
Pine Point, NWT	85 H/7

REFERENCES

Brown (1950).

National Mineral Inventory Report 506189.

PROPERTY

JT 1-6	85 H/7

LOCATION

The prospect is located about 13 km south-southeast of Rocher River. The area is immediately east of the mid-point of Snuff Channel, near its tributary with Little Hay Creek. Regionally, the JT claims are near the western margin of the Churchill Province of the Precambrian Shield about 15 km south of Great Slave Lake (Fig. 6-1).

HISTORY

The first recorded claim on the showings was the HOPE claim staked in 1920. In 1930 the BULL MOOSE, and adjoining HOPE claims were staked along with some 80 others in the area by George and Letha Kaine. In 1962, the JIM group of 33 claims was staked and recorded by F. Avery and C. La Chance of Yellowknife, and some trenching and sampling done.

In 1966 the ground apparently came open and was restaked as the RT group and acquired by Carolin Mines Ltd. A limited amount of geological work was done on showings that had been trenched several years previously.

The JT claims were recorded in the spring of 1983.

DESCRIPTION

Seven lead-zinc showings have been reported on the property. They occur as tension fracture fillings in an Archean porphyritic granite. One of the better showings (No. 6) consists of a vein 30 to nearly 100 cm wide striking southeasterly and dipping about 75° northeast. The vein has been trenched for 30 m, and has been traced for an additional 15 m. It consists of white quartz and calcite, with galena occurring as fragments, crystals and veinlets up to 2.5 cm across. A 30 cm band of breccia along the footwall contains most of the lead and zinc minerals. A channel sample across a 60 cm width of one of the better mineralized sections assayed 0.34 ppm (0.01 oz/ton) gold; 3.43 ppm (0.10 oz/ton) silver; 0.30% copper; 0.63% lead; 2.98% zinc.

No. 3 showing, a vein about 30 m long, and up to 30 to 45 cm wide is well mineralized with galena and sphalerite (Brown, 1950 and National Mineral Inventory, No. 506189).

CURRENT WORK AND RESULTS

In 1983 a group of prospectors from Pine Point re-examined quartz-galena-sphalerite-fluorite veins and blasted out fresh samples. Silver assays were lower than they had anticipated.

EAST ARM OF GREAT SLAVE LAKE
(ATHAPUSCOW AULACOGEN)

Hoffman (1974, 1977 and 1981) named the East Arm area the 'Athapuscow Aulacogen', a "deformed east-northeast-trending basin, 270 km long by, at most, 80 km wide. It contains little-metamorphosed early Proterozoic sedimentary and magmatic rocks exposed in and around the East Arm of Great Slave Lake".

The East Arm had little exploration for minerals in 1982 or 1983. Several prospectors and geologists made brief reconnaissance visits to the area. Asarco Exploration Canada Ltd. had a reconnaissance project in the Talthili Narrows area and Cominco Ltd. had one on Union Island.

BLATCHFORD LAKE PLUTONIC COMPLEX

INTRODUCTION

The Blatchford Lake intrusive suite includes all the plutonic rocks of alkaline affinity that form a coherent complex known as the Blatchford Lake Plutonic Complex. It lies at the southern margin of the Slave Province and is bounded by Blatchford Lake on the north and Hearne Channel of Great Slave Lake on the south (Davidson, 1978). Geological mapping by Davidson (1972, 1978) led to the recognition of several units that make up a multiphase, sub-circular ring complex some 23 km in diameter or 235 km^2 in area, that intrudes Archean plutonic rocks and metasediments of the Yellowknife Supergroup (Fig. 6-13).

The suite shows a remarkable range in composition that developed as the rocks crystallized during a sequence of intrusive events documented by field relationships (Davidson, 1972, 1978). Successive units range from gabbro (with anorthosite inclusions) through leuco-ferrodiorite, quartz syenite and granite to peralkaline granite and syenite (Davidson, 1982).

It is convenient to consider the Blatchford Lake complex in two parts: the earlier, western part including the Caribou Lake Gabbro, Whiteman Lake Quartz Syenite, Hearne Channel Granite and Mad Lake Granite, and the later, more extensive Grace Lake Granite with its Thor Lake Syenite core (Fig. 6-13).

It is within the later peralkaline units that rare element minerals are found (Davidson, 1982).

Isotopic determinations indicate an early Aphebian age (2,150 Ma) for the complex (Davidson, 1982).

THOR PROJECT

Highwood Resources Ltd.	Be,Ta,Nb,REE,Y,CaF_2,U,Th,Zr
#400, 805-8th Ave. S.W.	85 I/1,2
Calgary, Alta., T2P 1H7	62°07'N,112°35'W

REFERENCES

Davidson (1972, 1978, 1982); Gibbins (1981, 1983a, b, 1984); Grasty and Richardson (1972); Trueman (1984); Trueman and others (1984).

DIAND assessment reports 081258, 081343.

PROPERTY

THOR 1-45; NB 1-172; DISA 1-5 and REQ 1-3.

LOCATION

The claims are centered on a small lake 105 km southeast of Yellowknife known informally as Thor Lake, which is halfway between Blatchford Lake, 5 km to the north, and Hearne Channel of Great Slave Lake, 5 km to the south.

HISTORY

The area was staked as ODIN 1-4 in 1970 and uranium, thorium and rare earth elements were noted, but little work was done and the claims lapsed.

A government airborne radiometric survey flown in 1971 outlined a significant uranium and thorium anomaly (Grasty and Richardson, 1972). Dr. A.

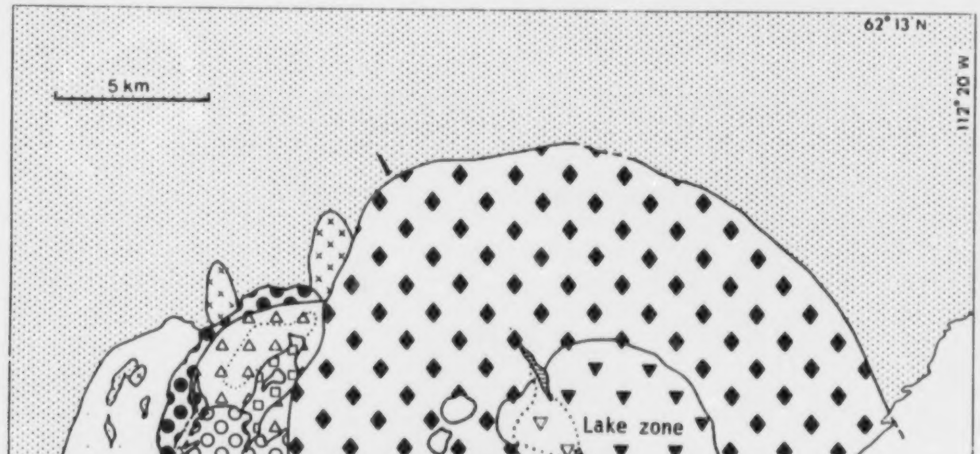

62°13'N
112°20'W
5 km
Lake zone
BF 1 claim
HEARNE CHANNEL
112°55'W
62°00'N
APHEBIAN
Compton Intrusions: diorite, quartz monzonite
Great Slave Supergroup
BLACHFORD LAKE COMPLEX
ARCHEAN
2-mica granite
Biotite granodiorite
Yellowknife Supergroup, Burwash Formation
Altered syenite and mineralized veins
Thor Lake Syenite
Grace Lake Granite
Hearne Channel and Mad Lake Granites
Whiteman Lake Quartz Syenite
Caribou Lake Gabbro: gabbro / leucoferrodiorite

FIGURE 6-13: Geology Blatchford Lake Complex (from Davidson, 1978)

Davidson of the Geological Survey of Canada mapped and defined the Blatchford Lake Complex and its central core of Thor Lake Syenite in 1971 and 1977 (Davidson, 1972, 1978).

During the fall of 1976, geologists of Highwood Resources Ltd. discovered a number of previously undiscovered mineral showings north of the original ODIN claims and staked the THOR 1-4 claims. Additional claims were added later when spectrographic analyses indicated quantities of niobium, yttrium and rare earth elements.

In 1977, Highwood did extensive prospecting, mapping, sampling and radiometric surveys including trenching in the T Zone and 335 m of diamond drilling in the S Zone (Gibbins, 1981). In 1978, 1091 m of drilling was done on the Lake and T Zones (Gibbins, 1983a).

In 1979, work was concentrated on the Lake Zone, where 5 trenches and 5 drill holes (136 m) were completed and sampled (Gibbins, 1983b, p. 174). Wayne Johnson of Target Exploration Services Ltd. mapped the southeast portion of the claims and did a soil radon survey over the Lake Zone in 1979. In September, a crew from the Saskatchewan Department of Mineral Resources did a lake-bottom radiometric, resistivity and bathymetric survey that defined a number of radiometric anomalies beneath the shallower parts of Thor Lake (Gibbins, 1983b).

In the spring of 1980, the claims were optioned to Placer Development Ltd., who drilled 18 holes (2000 m) mainly in the Lake Zone in 1980 and 1981 (Gibbins, 1984, Table 5-9 and Fig. 5-27, p. 277). The core was logged, sampled, and measured for magnetic susceptibility and radioactivity. This work indicates three sub-horizontal mineralized layers 10 to 45 m thick within 100 m of the surface in the Lake Zone, containing 63 million tonnes of indicated and inferred material grading 0.03% Tantalum and 0.4% niobium (columbium) with significant amounts of rare earth elements (samarium 0.1%, cerium 1%, lanthanum 0.6%) and zirconium 3.5% (Highwood Resources Ltd., Annual Report 1981). The T Zone contains 1.15 million tonnes of 0.55% Nb_2O_5 inferred with a further 5.5 to 7 million tonnes probable. Some 67,000 tonnes of 1.5% Nb_2O_5 and 0.05% U_3O_8 are drill - inferred in the S Zone, and an equal amount of similar grade is possible (Highwood Resources Ltd., Annual Report, 1980).

Other work done in 1980 included line-cutting, VLF-EM and radiometric surveys. New trenches were blasted south of the T and S Zones and all previous trenches were cleaned and resampled. Laboratory testing included petrographic, scanning electron microscope (SEM), lithogeochemical and bench tests to study the alteration, ore mineral composition and paragenesis to learn more about the geology and metallurgy of the deposit.

Placer Development Ltd. relinquished the option in the spring of 1982.

DESCRIPTION

The claims cover the central core of the Blatchford Lake Plutonic Complex known as the Thor Lake Syenite. Davidson (1978) mapped five distinct sub-units of the Thor Lake Syenite. A sixth unit of altered and poorly exposed syenite outcrops around and south of Thor Lake (the Lake Zone, Figs. 6-13, 6-14). It is altered by replacement of hornblende with fine aggregates of hematite, albite, fluorite and pale biotite. Davidson (1978) interpreted this as intense alteration of pre-existing syenites, possibly developed under the influence of a late-stage magnetic vapour phase related to, though probably slightly later than, the emplacement of pegmatites and acmite-albite veins to the east.

A zone of black rocks containing veins and irregular masses of pink to buff-coloured fluorite-albite, known as the T Zone, extends north-northwest of Thor Lake for 1250 m. It cuts through the outer syenite contact into the Grace Lake Granite. The F or Fluorite Zone may be an extension of this zone. Similar rocks are associated with narrow systems of syenite pegmatite and acmite-albite veins extending east-northeast from the southern exposed part of the T Zone, referred to as the R and S Zones. All of these zones contain Nb, Ta and REE mineralization, along with high concentrations of Na, Zr, F, Be and locally Y, Th and U (Davidson, 1982).

The Lake Zone, where Placer Development Ltd. concentrated their work, is a 2 km^2 triangular-shaped area of dark, altered and brecciated rock beneath and south of Thor Lake (Fig. 6-14). According to Placer Development Ltd. geologists, brecciation is the dominant feature of the core. Syenite and pegmatitic syenite have mortar texture, some specimens display a streaming of crystal and rock fragments and locally there are rebrecciated breccias. 'Extensive biotite flooding appears as a "sea" of fine-grained, felty, matted biotite with crystal and rock fragment "islands". Zircon flooding is local and is marked by 30 to 50 percent zircon as crystal aggregates.' (DIAND assessment report 081343).

Petrographic work shows that the tantalum and columbium are present as tanto-columbite in altered syenite. Bastnaesite, (a cerium-lanthanum fluorocarbonate), allanite, perthitic feldspar, albite, fluorite, carbonate, green muscovite, biotite, and pseudomorphs after mafics and opaque minerals are also present. Tanto-columbite occurs as discrete grains intergrown with magnetite or interstitial with zircon in matrix and biotite-flooded areas. The overall average grain size of elongate tanto-columbite is 20 by 2 microns with a range of less than 10 to 150 microns long by 1 to 10 microns wide. Crystal aggregates are commonly 50 microns across,

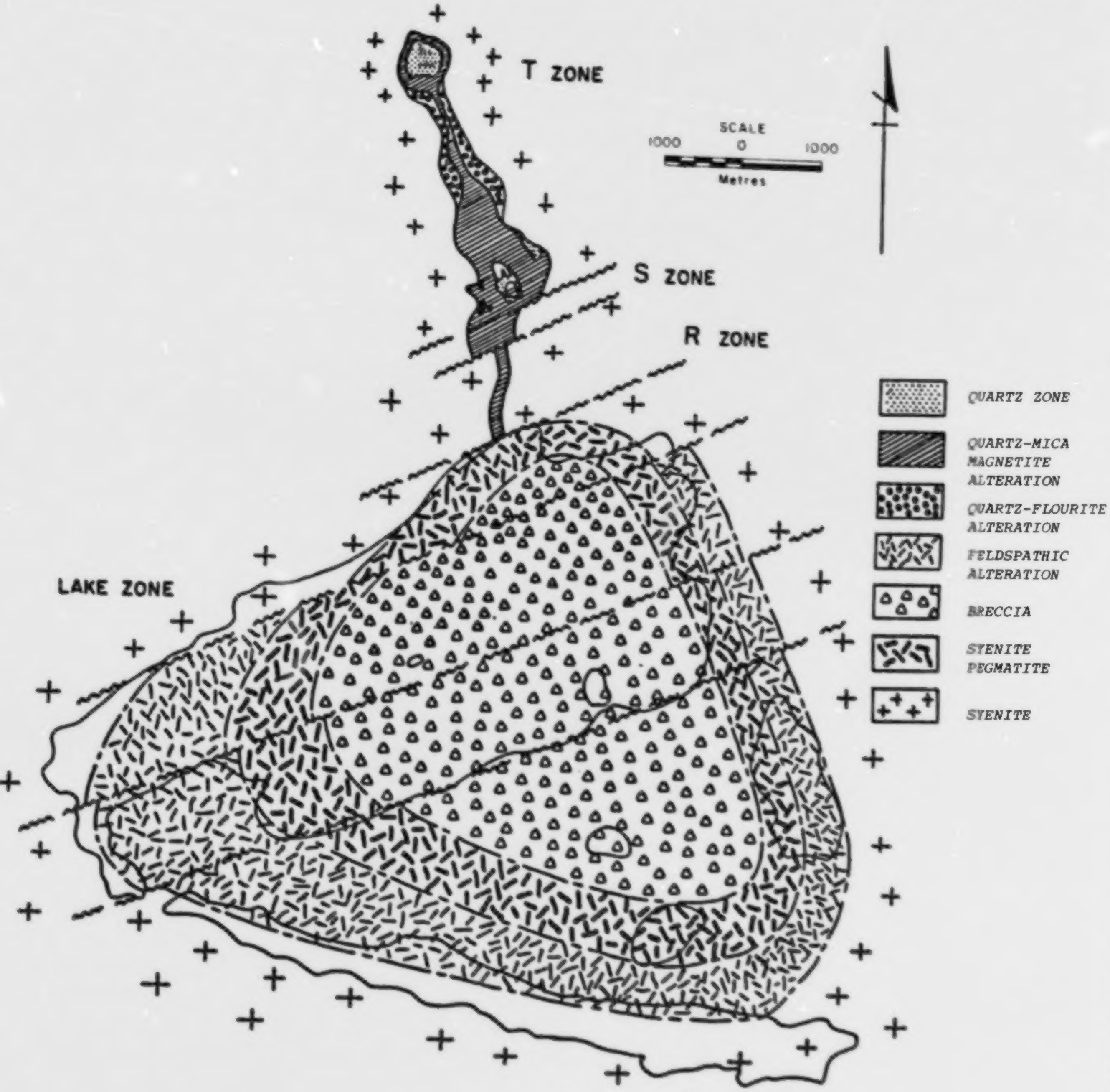

T ZONE
SCALE
1000
0
1000
Metres
S ZONE
R ZONE
LAKE ZONE
FLUORITE ZONE
QUARTZ ZONE
QUARTZ-MICA MAGNETITE ALTERATION
QUARTZ-FLOURITE ALTERATION
FELDSPATHIC ALTERATION
BRECCIA
SYENITE PEGMATITE
SYENITE

FIGURE 6-14: Distribution of rock types in the Thor Lake syenite altered core (from Highwood Resources Ltd.)

with a maximum range of 100 to 150 microns across.

Patterns of element depletion and enrichment throughout the differentiated suite are consistent with the hypothesis that the observed alteration and mineralization are the end-products of magmatic differentiation (Davidson, 1982).

CURRENT WORK AND RESULTS

1982:

A small bulk sample (4,500 kg) was collected from the Lake Zone and sent to Lakefield Research of Canada Ltd. for metallurgical tests. Magnetometer and scintillometer surveys were done along the southern limits of the property.

1983: T Zone

Following the recognition of important beryllium potential in the T Zone, exploration work was directed mainly towards defining grades and tonnages of this element. Work included re-logging previous drill core from the T Zone, detailed geological mapping (Fig. 6-14), an orientation lithogeochemical survey to identify pathfinder elements, berylometer surveys of core and outcrops, stripping and trenching for bulk samples and a major drilling program from October, 1983 to March, 1984. The drilling outlined some 415,000 tonnes of 1.0% BeO in the North T Zone and 1,180,000 tonnes of 0.66% BeO in the South T Zone for a total of 1,595,000 tonnes of 0.75% BeO to an approximate depth of 61 m (200 feet). A total of 4,174 m was drilled in 72 holes during the winter of 1983-84. Thirty-nine of these holes or 2,009 metres were drilled during 1983. The first two holes in the North T Zone intersected 21.3 m of 2.21% BeO, 3.0 m of 1.40% BeO, 21.6 m of 2.38% BeO, 4.6 m of 0.70% BeO and 12.2 m of 2.33% BeO. A 1,000 lb (456 kg) bulk sample from a pit in this area assayed 0.93% BeO over a length of 18.3 m. A second trench 500 m south assayed 1.61% BeO over a 19.8 m (65 foot) length. A total of 76 m^3 (2,675 cubic feet) was removed by trenching.

Beryllium is also present in the R Zone.

The beryllium at Thor Lake is contained in the mineral phenacite (Be_2SiO_4), a colorless or white glassy mineral that is similar to and often confused with quartz. It normally contains 40-45% BeO by weight. Phenacite (also spelled phenakite), was first reported in altered Thor Lake Syenite by Davidson (1978, p. 126). Preliminary tests indicate that the grain size of the phenacite is amenable to its recovery by an established flotation technique (Trueman, 1984).

Although the beryllium zones are still not fully explored, the Thor Lake deposits appear to be the most significant beryllium deposits in Canada. Meanwhile, additional exploration, metallurgical testing and a pre-feasibility study are underway (1984).

Beryllium is a rare-metal noted for its light weight (lighter than aluminum), high electrical resistivity, high thermal conductivity and heat capacity, high melting point, high strength to weight ratio, and high stiffness. By itself and in alloy form, beryllium finds wide use in electronic and aerospace applications. It is used in computers and peripherals, telephone and telecommunications, fibreoptics, aircraft struts and brakes, satellite frames, radar, and inertial navigation systems. Other applications include use in oil drilling and geophysical equipment, automatic transmissions, x-ray and CAT-

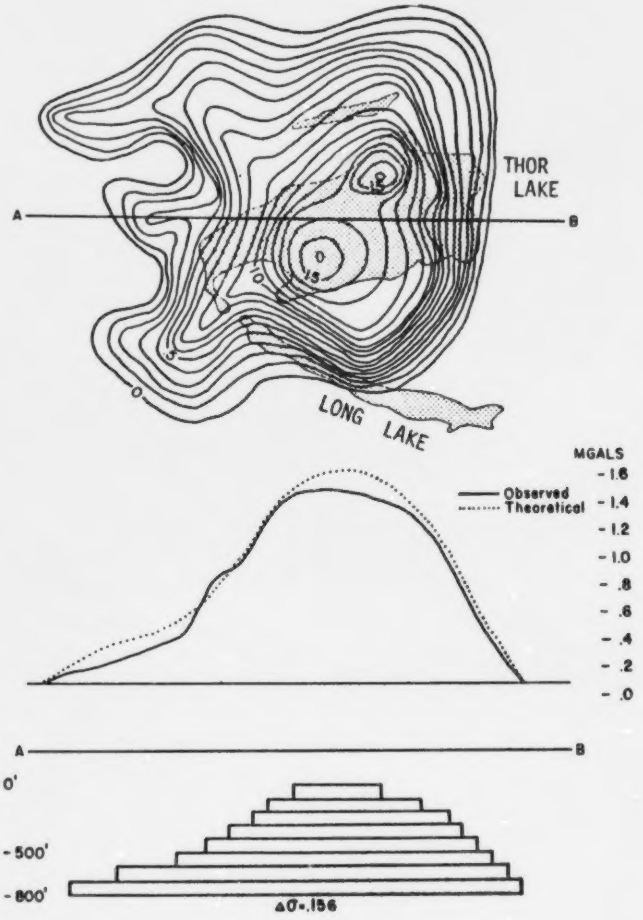


FIGURE 6-15: Residual Bouguer gravity anomaly at Thor Lake (from Highwood Resources Ltd.)

scan equipment, nuclear moderators, and VHSIC computer chips.

Lake Zone

A gravity survey of the Lake Zone was completed in the spring of 1983 to provide insight as to the attitude of the mineralized zones (Fig. 6-15). Modelling of the resulting Bouger gravity anomaly suggests that the tantalum-niobium-rare earth zone extends downward in the form of an inverted cone for several hundreds of feet (Trueman, 1984).

Structural studies of ultra-mylonite observed in core and outcrop, as well as offsets of lithologies, have indicated several fault systems that help explain and confirm the form of the deposits.

Three holes (465 m) drilled in the Lake Zone in the spring of 1984 indicate a greater tonnage than the previously published reserve of 63 million tonnes probably exist at depth.

Metallurgical studies based on oil-phase extraction techniques to recover very fine grained tantalum-niobium minerals continued during 1982 and 1983.

BF CLAIMS

The Big Fish Syndicate 85 I/2
3960 W 33 Ave. 62°04'N,112°30'W
Vancouver, B.C.

REFERENCES

Davidson (1978, 1982).

DIAND assessment report 081686.

PROPERTY

BF 1 and 2.

LOCATION

The claims are adjacent to the southern boundary of Highwood Resources Ltd.'s NB claims and include a discontinuous thin strip of the north shore of Hearne Channel, 3 - 8 km west of McKinley Point. Over 90 percent of the claim area is under the waters of Hearne Channel.

HISTORY

The BF 1 claim was recorded in September, 1978; BF 2 was recorded in October,1983.

DESCRIPTION

The BF 1 claim includes the southernmost boundary of Thor Lake Syenite and the enclosing Grace Lake Granite (Fig. 6-13). It also contains the intersection of this contact with the north shore of the Hearne Channel and the southeasterly projection of a structural lineament that passes through Highwood Resources Ltd.'s T Zone and Flourite zones (Davidson, 1978, 1982). This southeast-trending lineament is clearly evident on the aeromagnetic maps (Geol. Surv. Can., Map 7190 G). Speculations suggests that this intersection may be the loci for the deposition of tantalum, tin and rare earth minerals similar to those found at Thor Lake or Mountain Pass, California.

CURRENT WORK AND RESULTS

Two trenches were blasted and sampled, one in a quartz-fluorite pegmatite vein and the second in a dolorite dyke. Samples were sent for fire-assay to determine gold and silver and for ICP (inductively coupled Argon Plasma) analysis for another 30 elements.

Magnetometer and scintillometer surveys were undertaken, but significantly elevated readings were not encountered.

THE GREAT SLAVE PLAIN

INTRODUCTION

The Great Slave Plain is that part of the Interior Plains between latitudes 60 and 64°N and between the Franklin Mountains and the western edge of the Precambrian Shield in the vicinity of Great Slave Lake. It is underlain mainly by Paleozoic carbonates, evaporites and shales. It has a relatively flat topographic surface, generally less than 300 m in elevation, that is characterized by sparse outcrop, abundant swamp, sink holes and karst topography. The Horn Plateau, which consists of Mesozoic strata, is a broad, smooth upland,rising to 835 metres in elevation.

The Great Slave Plain includes the Pine Point Lead-Zinc District (Fig. 6-16), the source of a large proportion of the Northwest Territories' annual production of minerals. Because of extensive overburden, the flat-lying attitude of the host rocks and the nature of Pine Point type Pb-Zn deposits, exploration is mainly by IP surveys (Lajoie and Klein, 1979) and fence or grid drilling. Attempts to find deposits using rock and soil geochemistry, gravity and EM surveys have not been cost effective. Most exploration work is done in the winter months when the widespread swamps and muskegs are frozen.

Activities in the Pine Point Lead-Zinc District were severely affected by the 1982 economic recession and accompanying low metal prices. Pine Point Mines

Ltd., the only producer in the region (see Chapter 2), shut down operations from January 2 to June 15, 1983. Mine production came from five operating and two developing pits in 1983 compared with eleven pits in 1982. About 900,000 tonnes of ore was milled in the six and a half month operating period in 1983, compared to about 2,200,000 tonnes for all of 1982.

Tabular ore zones were mined for the first time in 1981 and most of the 1982-83 production came from deposits of the North Trend (Alldrick and others, 1981; Rhodes and others, 1984).

Exploration statistics are given in Table 6-6 for the years 1982 and 1983. However, most of this work is on mineral leases and the results are rarely reported as assessment work or to the public. When assessment work is required, it is not submitted in the form of comprehensive geological reports. Much of the 1979-1983 drilling was along the North Trend, near the northern boundary of the Pine Point claims, where considerable reserves have been outlined. In 1982, 1875 m of drilling (10 holes) on the JMBS claims and 350 m (3 holes) on the AJME claims (Fig. 6-16) was submitted for assessment purposes.

Late in 1981 a large prismatic-type ore body (N-81) containing 0.9 million tonnes of high grade Pb-Zn, was discovered about 20 km west-southwest of the concentrator (Fig. 6-16). The 1982 exploration program confirmed the existence of 1.8 million additional tonnes of ore. The N-81 deposit contains a total of 2.7 million tonnes of ore grading 7% lead and 14% zinc and is expected to become the most important production area over the next five years (Carter, 1984).

The 1983 exploration program was successful in discovering 700,000 tonnes of ore grading 1.1% lead and 4.2% zinc in two production areas on the property.

TABLE 6-6: SUMMARY OF EXPLORATION ON PINE POINT MINERAL LEASES

	1982	1983
Expenditure (millions of dollars)	3.7	2.4
Geophysics - IP (line-km)	431	96.5
Exploration drilling (m)	43,282	35,052
Ore outline drilling (m)	16,154	69,970

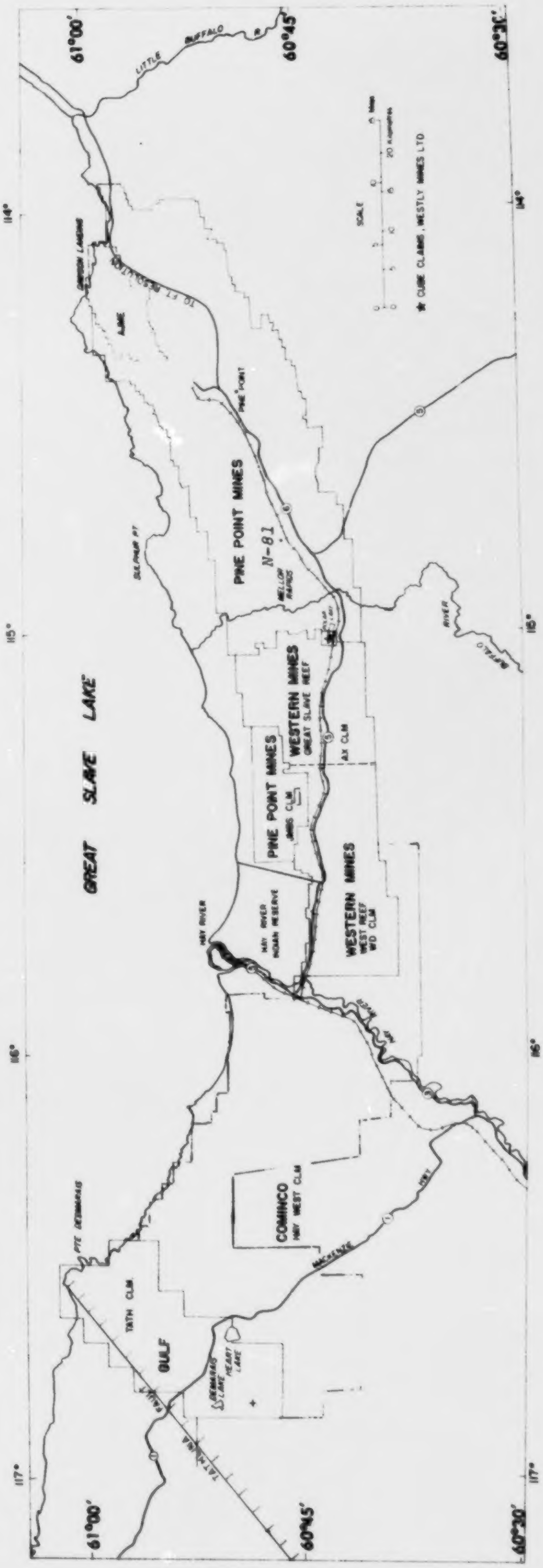

GREAT SLAVE LAKE
PINE POINT MINES
N-81
WESTERN MINES
GREAT SLAVE REEF
AX CLM
JMBS CLM
HAY RIVER INDIAN RESERVE
WEST REEF WD CLM
COMINCO
HAY WEST CLM
GULF
TATH CLM
AJME
LITTLE BUFFALO R
BUFFALO RIVER
HAY RIVER
MACKENZIE HWY
61°00'
60°45'
60°30'
114°
115°
116°
117°
SCALE
★ CUBE CLAIMS, WESTLY MINES LTD

FIGURE 6-16: Claim ownership south and west of Great Slave Lake.

GREAT SLAVE REEF AND WEST REEF PROJECTS

Westmin Resources Ltd.	Lead, Zinc
Suite 904, 1055 Dunsmuir St.	85 B/11-14
P.O. Box 49066,	60°45'N,115°10'W
The Bentall Centre	
Vancouver, B.C., V7X 1C4	

REFERENCES

Douglas and Norris (1974); Gibbins (1978, 1979, 1981, 1983a, 1984); Norris (1965); Skall (1975, 1976); Spencer and others (1980).

PROPERTY

2477 AX; WD; GSR; BES and MR claims.

LOCATION

The AX group or Great Slave Reef Project covers a 16 by 16 km area straddling NWT Highway 5 between the Buffalo River and Pine Point Ltd. holdings to the east and Birch Creek to the west (Fig. 6-16). The WD claims form a block 9.6 km wide by 25 km long between Birch Creek and Hay River. They are immediately west of the AX claims and are known as the West Reef Project.

HISTORY

Most of the area was staked between 1965 and 1967, but little exploration was done because target stratigraphic units are too deep to be tested by conventional geophysics.

During March and April, 1975, Western Mines Ltd. acquired the AX claims and entered a joint venture with DuPont of Canada Exploration Ltd. to explore them. The WD and GSR claims were staked early in 1976. Between November, 1975 and April, 1976, over 12,800 m were drilled in 72 holes on the AX group.

During 1976, 130 holes totalling 32,004 m were completed and the X-25 deposit was discovered and partly delineated. Reconnaissance or Phase I drilling traced the main reef (Presqu'ile Formation) at depths of 137 to 220 m over the entire strike length staked by Western Mines Ltd. (Gibbins, 1978 and 1979).

In the summer of 1977, 17,347 m of diamond drilling resulted in expansion of the reserves of the X-25 Zone and in the discovery of two additional mineralized zones (Gibbins, 1981). In 1978, 18,850 m of drilling identified and tested the R-190 and V-46 zones (Gibbins, 1983a).

Preliminary feasibility studies completed in November, 1979, resulted in a downward revision of the estimate of the undiluted mineral inventory for the R-190 and X-25 deposits and showed that these mineral deposits were not economically viable at current metal prices.

Significant drill intersections were given in previous Mineral Industry Reports (Gibbins, 1978, 1979 and 1983a).

Western Mines Ltd. continued their systematic exploration of the Great Slave Reef properties by diamond drilling 28,050 m (165 holes) in 1980 and 15,555 m (92 holes) in 1981. The 1980 drilling encountered two additional zones, O-556 and P-449, west of the original R-190 discovery.

DESCRIPTION

The 'Main Hinge Zone', along which many of the mineral deposits in the Pine Point District lie (Fig. 2 of Skall, 1975), extends westward across the AX and WD claims at a depth of over a hundred metres. This zone corresponds closely to the Devonian Pine Point barrier reef complex, which passes into time-equivalent evaporites (Muskeg Formation) and tidal flat deposits (J Facies of Skall, 1975) to the south, and shales to the north. Outlining the reef complex, now largely altered to coarse-grained dolomite known as Presqu'ile Facies, was the initial exploration goal.

According to Skall (1975, 1976), penecontemporaneous faults or hinge zones were instrumental in barrier complex facies development. These faults remained lines of weakness with occasional renewed movements and were enhanced during paleokarst development. They served as conduits for magnesium-rich brines that formed the Presqu'ile dolomite and localized lead-zinc deposition.

The joint venture group has been exploring a length of the barrier reef belt lying to the west of the Pine Point property. The ore-bearing formations lie at depths ranging from 150 to 300 m below surface. Exploration strategy has consisted of wide-spaced drilling to define the trend of the reef, followed by more closely spaced grid drilling along established mineralized trends. The size and shape of the targets has influenced drill-hole spacing.

Grid drilling in the vicinity of significant drill intercepts has resulted in four discoveries. Induced-polarization surveys have detected secondary features associated with two deposits. Rock geochemical and geological data have guided the discovery of another deposit. Trace-element halos are associated with the deposits and vary according to depositional style. These exploration guides, in conjunction with grid drilling, are expected to become more important as target depths increase (Spencer and others, 1980).

CURRENT WORK AND RESULTS

Continued exploration drilling by Westmin Resources Ltd. in 1982 resulted in a better definition of high-grade cores in the P-499 and 0-556 zones and in upgrading reserves in the R-190 zone to 1.08 million tonnes grading 17.8% combined lead-zinc. The 1983 drilling better defined the high-grade portions of the R-190 and X 25 deposits and a single hole drilled at the Z-155 deposit suggests a potential to increase tonnage and grade (Westmin Resources Ltd., 1983 Annual Report). Annual drilling from 1979 to 1983 has been 27,735 - 28,040 - 15,550 - 6,705 - and 11,275 metres.

To the end of 1983, Westmin has found seven mineral deposits with an aggregate tonnage of 6.3 to 8.1 million tonnes (depending on cut-off grade used), with a combined average grade of about 10% Pb + Zn. These deposits, designated X-25, W-19, V-46, Z-155, R-190, 0-556 and P-499, are comparable in size and grade to those at Pine Point Mines, ranging from about 180,000 to greater than 2.7 million tonnes.

Future work will focus on mine evaluation with particular emphasis on hydrologic factors.

HAY WEST PROJECT

Cominco Ltd.	Lead, Zinc
7th Floor, 409 Granville St.	85 B/12,13;
Vancouver, B.C., V6C 1T2	85 C/9-11,14-16
	60°30'-61°N,
	115°30'-117°W

REFERENCES

Barbier (1983); Belyea (1971); Douglas (1970, 1974); Douglas and Norris (1974); Gibbins (1983b, 1984); Jamieson (1967); Macqueen and others (1975); Serres and Wiles (1978); Skall (1975, 1976); Williams (1977).

DIAND assessment report 081460.

PROPERTY

EL 1-75; EZ 1-20; HART 1-42; HAY 1-25; KAK 1-9; MAC 1-20; STRAW 1-7; TAT 1-11; XYL 1-6; ZM 1-6; BERRY 1; LAKE 1.

LOCATION

The property consists of 208 claims at the southwest end of Great Slave Lake and is centred 40 km west-southwest of Hay River (Figs. 6-16, 6-17). NWT Highways 1 and 2 provide all-weather access to much of the area. Winter roads provide access to the rest of the area.

HISTORY

Several oil and gas wells were drilled in the area during the 1950's (Belyea, 1971 and Williams, 1977). Cominco Ltd. and Pine Point Mines Ltd. staked the 2000-sq-km area in the summer of 1978. Samim and Aquitaine Co. of Canada have also entered into the joint venture.

Thirteen holes totalling 5,900 m were drilled on the Hay West property during 1979 (Gibbins, 1983b). This drilling confirmed the continuity of the favourable Presqu'ile dolomite, host rock of much of the ore in the Pine Point Lead-Zinc District. Trace amounts of lead and zinc were encountered and hydrogen sulfide gas was encountered at the top of the Slave Point Formation in three of the holes.

In March and April,1980, the STRAW, BERRY and XYL claims were added and in March,1981, the LAKE claim was staked bringing the Hay West claim block to a total of 223 claims (10,347 units). In June, 1981, 103 of the original claims were abandoned leaving a total of 120 claims (5223 units or 109,371 ha). The claim block now consists of the following claims:

EL 14-19, 21-39; HART 1-17, 19-20, 23, 26-29, 42; HAY 1-25; MAC 1-7, 9-12, 15-19; TAT 1-5, 7, 9, 11; ZM 1-6; STRAW 1-7; BERRY 1; XYL 1-6; and LAKE 1.

During the period 1979-1981, 42 holes totalling 19,422.9 m were drilled on the Hay West project claims: 5894.7 m (13 holes) in 1979, 9702.7 m (19 holes) in 1980 and 3825.5 m (10 holes) in 1981. Most of the holes were drilled on a reconnaissance grid designed to provide a regional geologic map of the property, using geological descriptions, rock geochemistry and geophysical logging of selected holes.

The reconnaissance grid drilling was successful in defining the approximate limits of the Muskeg Formation evaporite facies, distinctive back reef and main reef trends of the Pine Point barrier complex, and the approximate position of the Pine Point Formation-Sulphur Point Formation shale-out towards the western edge of the property. Two of the 1981

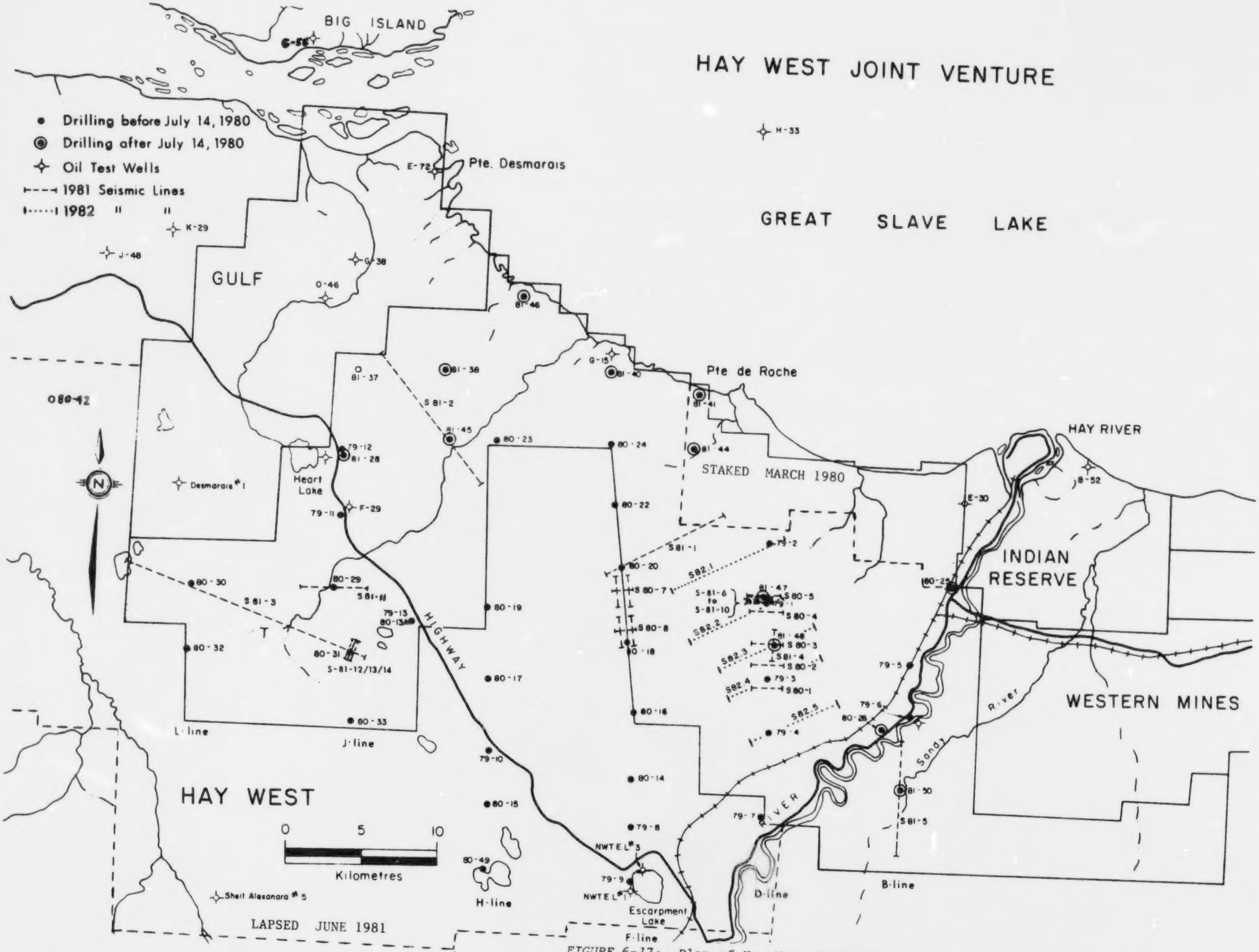

HAY WEST JOINT VENTURE
GREAT SLAVE LAKE
BIG ISLAND
G-56
H-33
● Drilling before July 14, 1980
◎ Drilling after July 14, 1980
✧ Oil Test Wells
1981 Seismic Lines
1982 " "
K-29
J-48
E-72
Pte. Desmarais
GULF
G-38
O-46
81-46
G-15
81-40
Pte de Roche
81-41
81-44
STAKED MARCH 1980
81-37
81-38
S 81-2
81-45
O80-42
80-23
80-24
79-12
81-28
Heart Lake
Desmarais #1
79-11
F-29
80-22
S81-1
79-2
S82.1
80-20
S80-7
S-81-6 to S-81-10
81-47
S80-5
S80-4
S82.2
S80-8
81-48
S80-3
S81-4
S80-2
S82.3
79-3
S82.4
S80-1
10-18
80-30
S81-3
80-29
S81-11
79-13
80-13
80-19
80-32
80-31
S-81-12/13/14
HIGHWAY
80-17
80-16
S82.5
79-4
79-6
80-26
79-5
E-30
80-25
INDIAN RESERVE
HAY RIVER
B-52
Sandy River
WESTERN MINES
81-50
S81-5
80-33
L-line
J-line
79-10
HAY WEST
80-14
80-15
0 5 10
Kilometres
80-49
H-line
79-8
NWTEL #3
79-9
NWTEL #1
Escarpment Lake
F-line
79-7
RIVER
D-line
B-line
Shell Alexandra #5
LAPSED JUNE 1981
N

FIGURE 6-17: Plan of Hay West joint venture showing seismic lines and drill holes.

holes (W-81-47 and 48) were drilled to test collapse features outlined during 1980 and 1981 seismic surveys (Fig. 5-16 of Gibbins, 1984).

In 1980, several holes encountered hydrogen sulphide gas and had to be abandoned. Hole HW-80-49 was abandoned and cemented off due to a blow-out of crude oil, methane and hydrogen sulfide gas, emulsified oil-water and water at 453.2 m. In the 1981 program, all drilling contractors were required to use blow-out prevention equipment, H_2S detectors, large heated mud-tanks and a prescribed mud program.

In 1980 and 1981, 66.3 and 75.6 line-km of Mini-Sosie seismic profiles were run in areas of anomalies interpreted as reef or collapse zones (Fig. 6-17). The Mini-Sosie seismic reflection system is a patented process developed by Societe National Elf-aquitaine (Production) Ltd. It is used in shallow (30-1200 m range) high-resolution seismic exploration. The technique and equipment are described by Serres and Wiles (1978) and Barbier (1983). The Hay West surveys were carried out in the spring of the year, while the ground was still frozen, by Compagnie Generale de Geophysique of Calgary. The object of the surveys was to map the Hay River Formation-Slave Point Formation interface and to search for other recognizable features in the Slave Point and Pine Point Formations.

DESCRIPTION

Outcrop in the property area is sparse and mainly confined to the Hay River Escarpment (Jamieson, 1967). Consequently, subsurface geological information obtained from drilling and seismic work is necessary to define the geological framework of the area (Belyea, 1971; Douglas 1970, 1974; Macqueen and others, 1975; and Williams, 1977).

The Hay West area straddles the extension of the Devonian barrier reef complex (Skall, 1975, 1976) and the westward extension of the Slave-Chantrey mylonite zone (McDonald fault) in the Precambrian basement. The Tathlina Uplift to the west is a basement high that was subjected to periodic uplift during much of the Middle Devonian and consequently controlled sedimentary facies during this time (Belyea, 1971). The Tathlina Uplift is related to prominent northeasterly trending lineaments crossed by less prominent northwesterly trending lineaments.

Deposition of the Middle Devonian Slave Point Formation was followed by uplift and erosion. Onlap of the Upper Devonian (Hay River Formation shales) marked a complete change of depositional and tectonic style. Recrystallization of Sulfur Point Formation and Upper Pine Point Formation strata to coarse crystalline dolomite seems to follow the northeasterly trends and the break between the Pine Point-Muskeg and Sulfur Point Formations (Belyea, 1971).

CURRENT WORK AND RESULTS

Between December 14, 1981 and January 30, 1982, 58 line-km of seismic data was collected in the east central part of the Hay West claim block (Fig. 6-17). Figure 6-18 is taken from line S82-3 and shows what is believed to be the Hay River Formation-Slave Point Formation interface and a possible collapse feature below it.

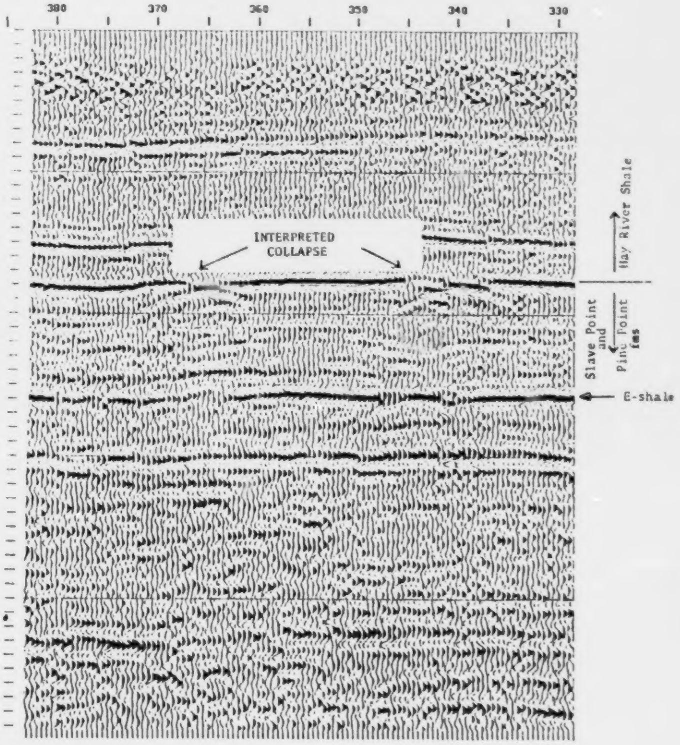


FIGURE 6-18: Portion of seismic line S82-3 in the vicinity of drill hole 81-48 showing interpreted collapse and geologic markers (from DIAND assessment report 081483)

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CHAPTER 7: BEAR STRUCTURAL PROVINCE

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INTRODUCTION

The geology of the Bear Structural Province (Fig. 7-1) has been summarized in several previous Mineral Industry Reports (Seaton, 1978, 1981, 1983a, 1984; Seaton and Hurdle, 1978). In this report no attempt is made to summarize the geology beyond a statement of the geological subdivisions under which the properties have been grouped. Several Geological Survey of Canada and university thesis projects are in progress covering parts of the Bear Province and it is anticipated that soon a drastically revised geological summary may be required.

The East Arm Subprovince, though geologically included with the Bear Province, is covered in Chapter 6 of this Mineral Industry Report.

Primary grouping of properties in this section is under the headings: 1) Wopmay Orogen, and 2) Amundsen Basin-Wopmay Orogen (where properties and projects span or lie close to the Aphebian-Helikian unconformity).

Within this framework a secondary arrangement of properties in alpha-numerical sequence of NTS references is used.

References relating to individual property descriptions are listed separately in the appropriate sections. General information on the Bear Structural Province and detailed reports on mapping of specific areas of the Bear Province include those by: Allan and Cameron (1973); Badham (1972, 1976, 1978); Baragar and Donaldson, (1973); Campbell (1978, 1979); Campbell and Cecile (1975, 1976a,b,c, 1979); Cecile and Campbell (1977); Easton (1980); Fraser (1964, 1974); Fraser and others (1972); Gibb (1978); Grasty and Richardson (1972); Grotzinger (1982); Henderson, J.F. (1949); Hildebrand (1981, 1982); Hoffman (1973, 1977, 1978, 1980a,b); Hoffman and Bell (1975); Hoffman and Cecile (1974); Hoffman and Henderson (1972); Hoffman and McGlynn (1977); Hoffman and others (1970, 1977, 1978, 1980); Hoffman and Pelletier (1982); Kerans and others (1981); Kidd (1936); Kindle (1972); Lord (1941, 1942, 1951); Lord and Parsons (1952); Miller (1982); McGlynn (1957, 1974, 1975, 1976, 1977, 1980); McGlynn and Ross (1963); Mursky (1963, 1973); Padgham and others (1974); Shegelski and Murphy (1972); Shegelski and Thorpe (1972); Smith (1962, 1967); St-Onge and Hoffman (1980); Thorpe (1970); Tremblay (1971); Wilson and Lord (1942).

Most figures in this section of the 1982-1983 Mineral Industry Report are from McGlynn's 1977 1:1,000,000 geological compilation (Geol. Surv. Can. Open File 445). Though this is adequate to show the gross geological settings of properties, it requires updating.

An appendix to Chapter 7 on page 286 gives a rough indication of relative expenditures by companies on various projects in various areas and provides a comparison with expenditures in the Slave Structural Province.

WOPMAY OROGEN

The Wopmay Orogen (Hoffman, 1981) comprises Aphebian sediments, volcanics and plutons to the east of Great Bear Lake. From east to west, the Wopmay Orogen includes the following (Fig. 7-1):

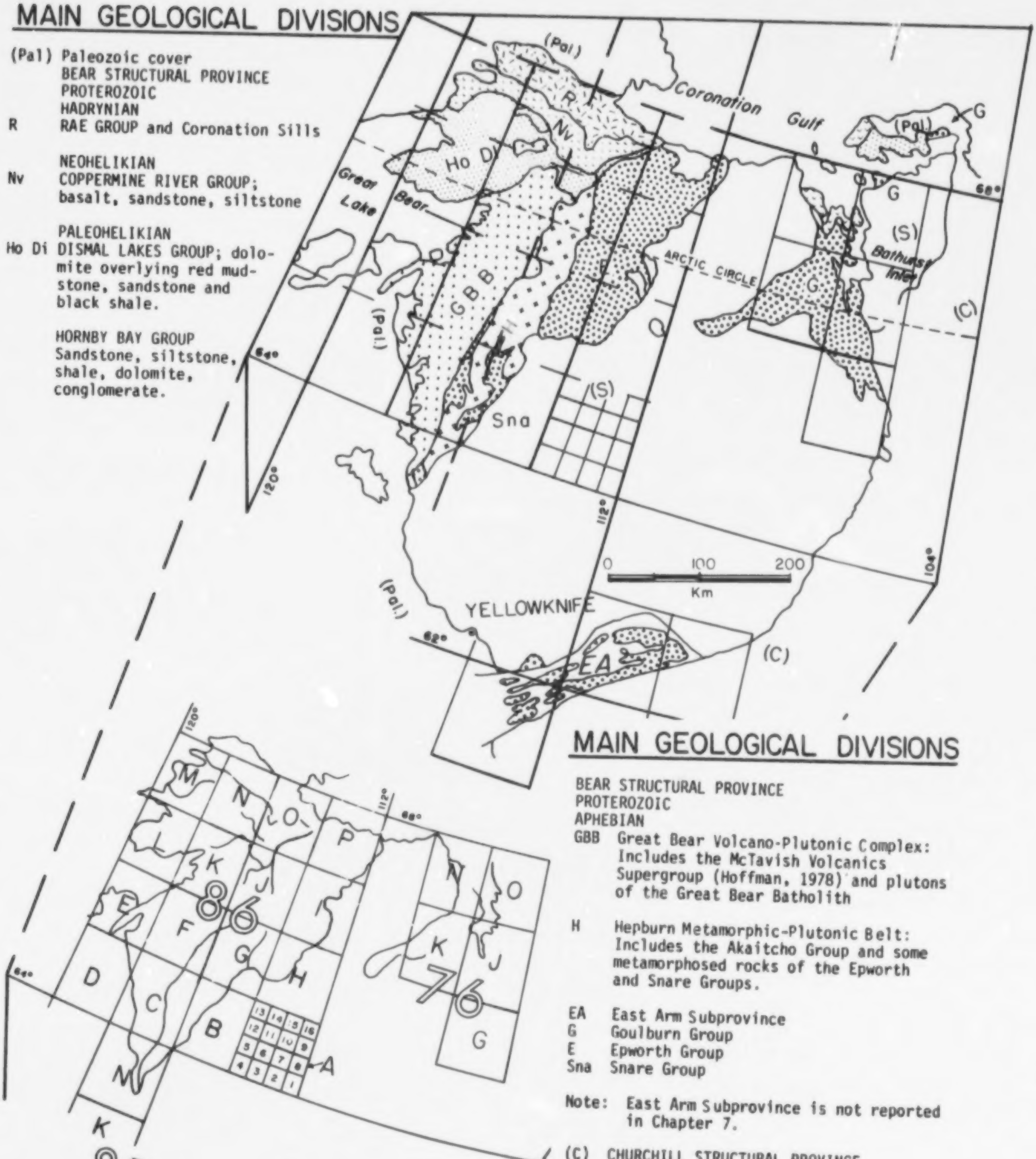
a) Epworth Group sediments of the autochthonous zone.

b) Epworth Group sediments and volcanics of the Asiak Fold and Thrust Belt.

c) Epworth and Akaitcho Group metasediments and metavolcanics of the Hepburn Metamorphic-Plutonic Belt.

d) The Great Bear Volcano-Plutonic Complex, which comprises mainly synvolcanic granitoid plutons and associated, largely subaerial, volcanics of the McTavish Supergroup. Parts of the complex are underlain by sediments and intrusive quartz porphyry or quartz-feldspar porphyry.

e) The Hottah Terrane, which consists of metamorphic rocks of uncertain, though probably Aphebian, age exposed in the Hottah Lake and Leith Peninsula areas.


(Pal)
R
Nv
Ho Di
Coronation Gulf
G
(Pal)
68°
Great Bear Lake
G B B
H
ARCTIC CIRCLE
(S)
Bathurst Inlet
G
(C)
(Pal.)
64°
(S)
Sna
120°
112°
104°
0
100
200
Km
(Pal.)
YELLOWKNIFE
62°
EA
(C)
120°
M
N
O
P
L
K
J
E
86
F
G
I
112°
68°
N
O
K
J
64°
D
C
H
76
B
13 14 15 16
12 11 10 9
5 6 7 8
4 3 2 1
A
G
M
K
85
62°
L
K
H
75

MAIN GEOLOGICAL DIVISIONS

(Pal) Paleozoic cover
BEAR STRUCTURAL PROVINCE
PROTEROZOIC
HADRYNIAN
R RAE GROUP and Coronation Sills

NEOHELIKIAN
Nv COPPERMINE RIVER GROUP; basalt, sandstone, siltstone

PALEOHELIKIAN
Ho Di DISMAL LAKES GROUP; dolomite overlying red mudstone, sandstone and black shale.

HORNBY BAY GROUP
Sandstone, siltstone, shale, dolomite, conglomerate.

MAIN GEOLOGICAL DIVISIONS

BEAR STRUCTURAL PROVINCE
PROTEROZOIC
APHEBIAN

GBB	Great Bear Volcano-Plutonic Complex: Includes the McTavish Volcanics Supergroup (Hoffman, 1978) and plutons of the Great Bear Batholith
H	Hepburn Metamorphic-Plutonic Belt: Includes the Akaitcho Group and some metamorphosed rocks of the Epworth and Snare Groups.
EA	East Arm Subprovince
G	Goulburn Group
E	Epworth Group
Sna	Snare Group

Note: East Arm Subprovince is not reported in Chapter 7.

(C) CHURCHILL STRUCTURAL PROVINCE, PROTEROZOIC AND ARCHEAN

(S) SLAVE STRUCTURAL PROVINCE, ARCHEAN

N.T.S. KEY

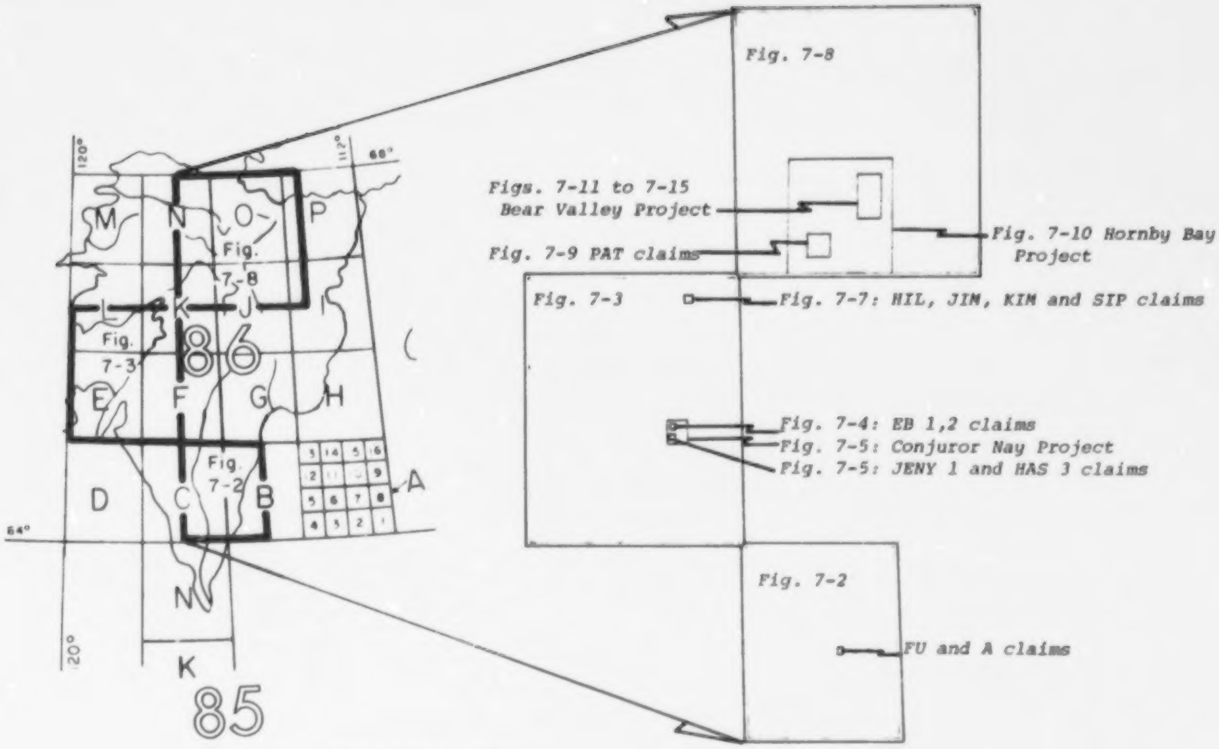
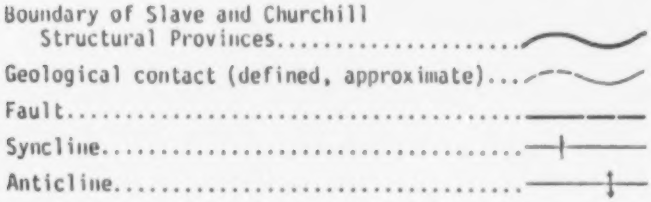


Fig. 7-8
Figs. 7-11 to 7-15 Bear Valley Project
Fig. 7-9 PAT claims
Fig. 7-10 Hornby Bay Project
Fig. 7-3
Fig. 7-7: HIL, JIM, KIM and SIP claims
Fig. 7-4: EB 1,2 claims
Fig. 7-5: Conjuror Nay Project
Fig. 7-5: JENY 1 and HAS 3 claims
Fig. 7-2
FU and A claims
120°
112°
68°
64°
M
N
O
P
Fig. 7-8
L
K
J
I
Fig. 7-3
86
E
F
G
H
D
C
Fig. 7-2
B
A
N
K
85

KEYS TO
FIGURE
LOCATIONS

FIGURE 7-1: Bear Structural Province. Map showing geological divisions, NTS coverage and figure location maps.

THESE SYMBOLS ARE COMMON TO ALL FIGURES IN CHAPTERS 7 AND 8


Boundary of Slave and Churchill Structural Provinces
Geological contact (defined, approximate)
Fault
Syncline
Anticline

Not reported separately in this section are diamond drilling by Terra Mines Ltd. at their Silver Bear-Norex-Smallwood Lake mines and adjoining property (86 E/9) and by Barons Oil Ltd. on their BO claims (86 E/9) on the Camsell River.

A, FU CLAIMS

G. Ryznar	Gold, Silver
4405 Glencanyon Dr.	86 B/5
N. Vancouver, B.C., V7N 4B4	64°27'N, 115°44'30"W

LEGEND

Hb	Gabbro sills and sheets

APHEBIAN

GREAT BEAR BATHOLITH

Ad	Granodiorite, quartz monzonite, granite
$_{E}$Apwv	Eastern sequence: greywacke mudstone turbidites, quartzite, shale, arkose,ash flow tuffs, basalts
$_{U}$Av	Volcanic flows and tuffs, sedimentary rocks, felsite intrusions undivided

HEPBURN METAMORPHIC-PLUTONIC BELT

Ag	Granodiorite, quartz monzonite, granite
An	Migmatite, veined gneiss, granitic gneiss, includes undifferentiated metamorphosed Snare or Epworth rocks

$_{S}$Asdr	Metamorphosed Snare rocks

SNARE GROUP

$_{S}$Avb	Basalt, tuff, minor chert
$_{S}$As	Siltstone, shale, quartzite, dolomite, minor intermediate volcanic rocks

ARCHEAN

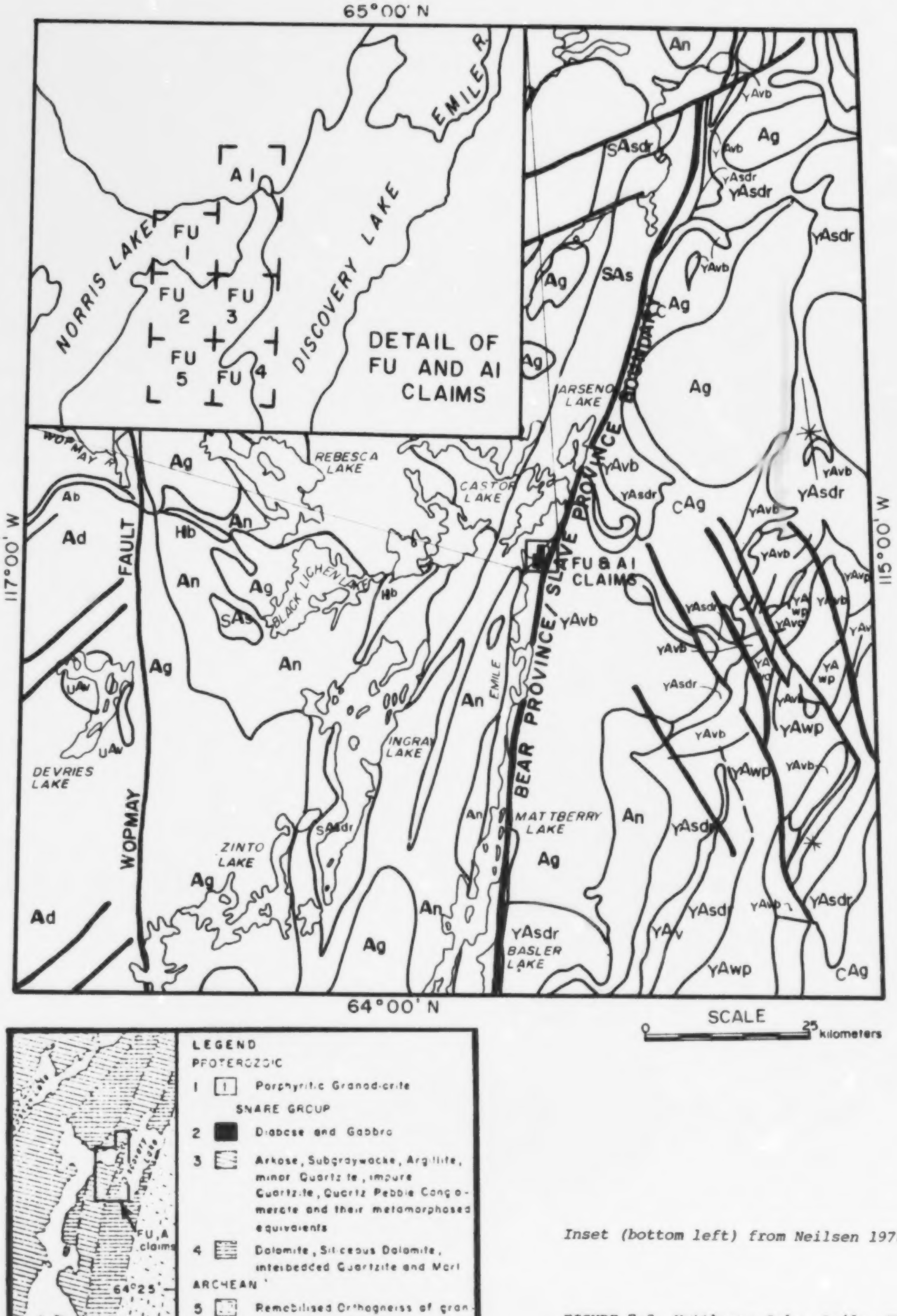
Note: The sequence of units of the Yellowknife Supergroup does not correspond to their stratigraphic sequence.

$_{Y}$Asdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks

YELLOWKNIFE SUPERGROUP

$_{Y}$Awp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
$_{Y}$Avo	Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks
$_{Y}$Avb	Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks
$_{Y}$Av	Volcanic rocks, undivided

$_{C}$Ag	Complex of plutonic gneisses, commonly of tonalite composition, in part cataclastic, that are basement to Yellowknife Supergroup. May include some younger plutonic rocks.


65°00' N
64°00' N
117°00' W
115°00' W
DETAIL OF FU AND AI CLAIMS
NORRIS LAKE
DISCOVERY LAKE
EMILE R.
AI
FU 1
FU 2
FU 3
FU 4
FU 5
WOPMAY R.
REBESCA LAKE
CASTOR LAKE
ARSENO LAKE
BLACK LICHEN LAKE
INGRAY LAKE
DEVRIES LAKE
ZINTO LAKE
MATTBERRY LAKE
BASLER LAKE
EMILE
WOPMAY FAULT
BEAR PROVINCE/ SLAVE PROVINCE BOUNDARY
FU & AI CLAIMS
Ag
An
Ad
Ab
Hb
SAs
SAsdr
CAg
UAv
γAvb
γAsdr
γAwp
SCALE
0
25 kilometers
LEGEND
PROTEROZOIC
1 Porphyritic Granodiorite
SNARE GROUP
2 Diabase and Gabbro
3 Arkose, Subgraywacke, Argillite, minor Quartzite, impure Quartzite, Quartz Pebble Conglomerate and their metamorphosed equivalents
4 Dolomite, Siliceous Dolomite, interbedded Quartzite and Marl
ARCHEAN
5 Remobilised Orthogneiss of granitic - granodioritic composition
6 Remobilised Paragneiss
YELLOWKNIFE GROUP
7 Metamorphosed Pillow Basalt, Andesite, Tuff, Greywacke, Turbidite and Argillite
5Km
FU, AI claims
64°25'
115°45'
Norris Lake
Discovery Lake

Inset (bottom left) from Neilsen 1978

FIGURE 7-2: Mattberry Lake, Emile, Wopmay and Acasta Rivers area. Regional geology and property locations. Geology from McGlynn (1977)

REFERENCES

Broughton (1972); Frith (1973, 1978); Lord (1942, 1951); Padgham and others (1978); Thorpe (1966).

DIAND assessment report 081700.

PROPERTY

A 1; FU 1-5.

LOCATION

The claims are 235 km north-northwesterly of Yellowknife between Norris and Discovery Lakes.

HISTORY

The claims were first staked as the MIDAS claims in 1938 when gold was discovered there. In 1945, the claims were restaked as the AVIS and AS claims. After drilling by Doris Yellowknife Gold Mines Ltd. in 1946 and 1947, the claims lapsed (Lord, 1951). The claims were re-staked in 1965 as the HID 1-6 and MW 1-6 claims (Thorpe, 1966) and optioned by Prosper Oils Ltd. In 1968, Granex Mines Ltd. re-staked the claims as the KT group, and carried out detailed mapping and sampling in 1969 (Padgham and others, 1978).

The present claims, A 1 and FU 1-5, were recorded in December, 1974 by A. Shearcroft and transferred to G. Ryznar in March, 1982.

DESCRIPTION

Figure 7-2 shows the regional geology of the area. Other geological maps include those by Lord (1942) and by Broughton (1972) at 1:253,440 and 1:4200 respectively. Geology and metamorphism are further discussed in Frith (1973, 1978).

CURRENT WORK AND RESULTS

In 1983, a petrographic study was made of polished thin sections from seven samples taken from a trench in the main mineralized zone on the FU 2 claim (Fig. 7-2). The samples were analyzed for silver and gold. Assays ranged from 0.5 to 530 ppm Ag and less than 10 to 18000 ppb Au. Results of the petrographic study showed an association of gold with arsenopyrite and of silver with galena.

EB CLAIM

E. Buhlmann
10408 - 31 Ave.
Edmonton, Alta., T6J 2Y3

Silver
86 E/9 NE
65°40.5'N, 118°04'W

REFERENCES

Hildebrand (1984).

DIAND assessment report 081616.

PROPERTY

EB 1, 2.

LOCATION

The claims (Figs. 7-3, 7-4) are 410 km northwesterly of Yellowknife.

HISTORY

The property was formerly staked in 1976 and 1977 as the FO 1, 2 claims.

The EB 1 claim was recorded in February of 1981 and the EB 2 claim in March of 1983.

DESCRIPTION

The regional geology is shown in Figure 7-3. Hildebrand (1984) provides a more detailed and up-to-date map at 1:50,000.

CURRENT WORK AND RESULTS

The property was explored by geological mapping, excavating one trench and prospecting.

Silver was not found. Quartz-carbonate veins and pyritic tuff erratics were observed.

LEGEND

	Hb	Gabbro sills and sheets.
HELIKIAN		HORNBY BAY GROUP
	$H^{Hss'}$	Sandstone, minor conglomerate
	H^{Hs}	Hornby Bay Group undivided
APHEBIAN		GREAT BEAR BATHOLITH
	Ad	Granodiorite, quartz monzonite, granite
	C^{Avps}	Central sequence: intermediate to acidic ash flow tuffs, air fall tuffs with minor interbedded volcanogenic sedimentary rocks
	W^{Avs}	Western Sequence: basalt, andesite, rhyodacite, ash flow tuffs, quartzite, mudstone, conglomerate, chert. Related porphyry intrusions.
	Ap	Felsite porphyry intrusions, commonly intrusive equivalents of enclosing volcanic rocks

PROPERTIES

① EB 1,2

② JENY 1

③ HAS 3

④ Conjuror Bay Project

⑤ HIL, JIM, KIM, SIP

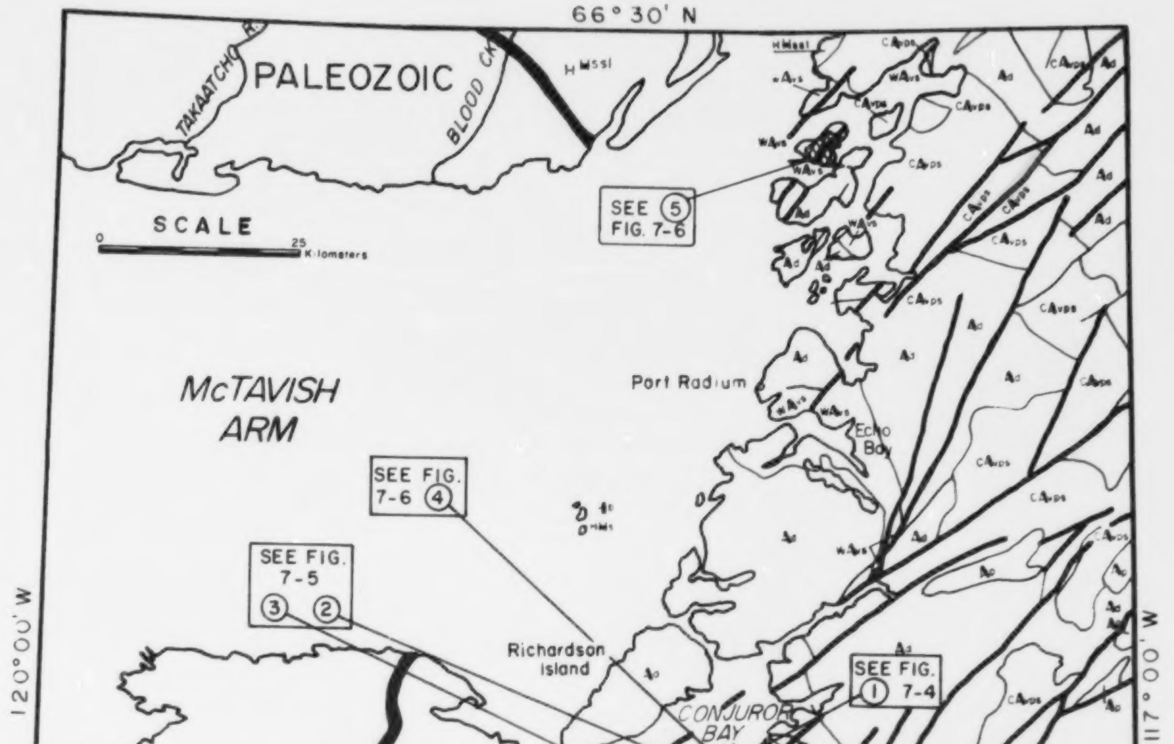

66° 30' N
PALEOZOIC
TAKAATCHO
BLOOD CK
HMssl
SCALE
0
25
Kilometers
SEE ⑤
FIG. 7-6
WAvs
CAvps
Ad
McTAVISH
ARM
Port Radium
Echo
Bay
SEE FIG.
7-6 ④
SEE FIG.
7-5
③ ②
Richardson
Island
CONJUROR
BAY
SEE FIG.
① 7-4
120° 00' W
117° 00' W
HMs
Hb
KWAY CHA
LAKE
GROUARD
LAKE
CAMSELL RIVER
TUCHAY
LAKE
HOTTAH
LAKE
ZEBULON
LAKE
PALEOZOIC
65°00' N

FIGURE 7-3: Great Bear Lake, McTavish Arm. Regional geology and properties. Geology from McGlynn, (1977).

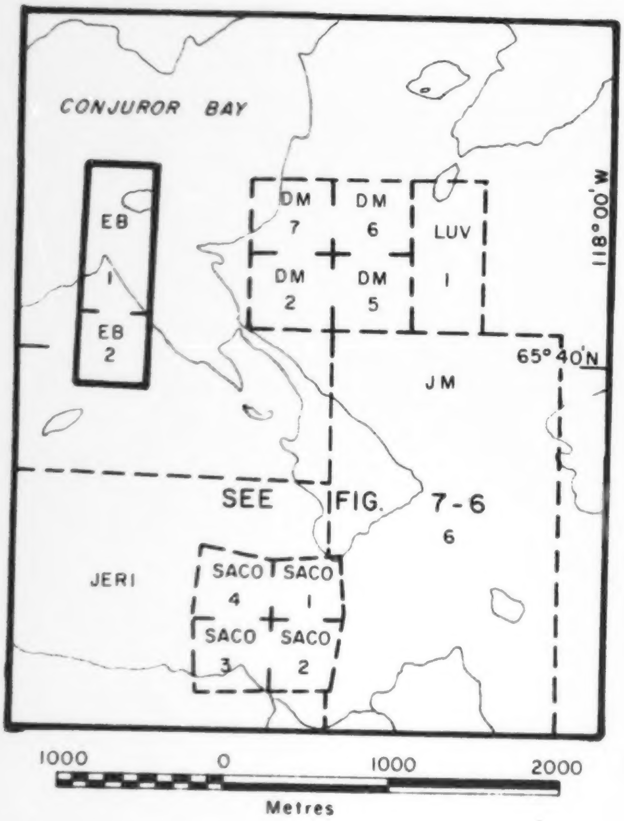

CONJUROR BAY
EB 1
EB 2
DM 7
DM 6
LUV 1
DM 2
DM 5
118°00'W
65°40'N
JM
SEE FIG. 7-6
6
JERI
SACO 4
SACO 1
SACO 3
SACO 2
1000
0
1000
2000
Metres

FIGURE 7-4: Location of EB 1,2 claims

HAS 3 CLAIM

Terra Mines Ltd.
202, 7608 - 103 St.
Edmonton, Alta., T6E 4Z8

Silver
86 E/9 NE
$65^0$36'N, $118^0$07'W

REFERENCES

Hildebrand (1984).

DIAND assessment reports 108177, 018858.

PROPERTY

HAS 3.

LOCATION

The claim (Figs. 7-3, 7-5) is 400 km northwesterly of Yellowknife.

HISTORY

Magnet Exploration Ltd. staked the property as part of the BELL claim group in the 1960's. HAS 3 was recorded in May of 1980 by Terra Mines Ltd.

DESCRIPTION

The regional geology is shown in Figure 7-3. Hildebrand (1984) provides a more detailed and up-to-date map at 1:50,000.

CURRENT WORK AND RESULTS

Geological mapping, prospecting and a VLF-EM survey were done over part of the HAS 3 claim. Outcrops of syenite and granite were mapped and three EM conductors were attributed to overburden sources.

Chalcopyrite, pyrite, arsenopyrite and fluorite were found in angular boulders of 1 or 2 metres diameter. The sulphides are in veins, lenses and pods in the boulders.

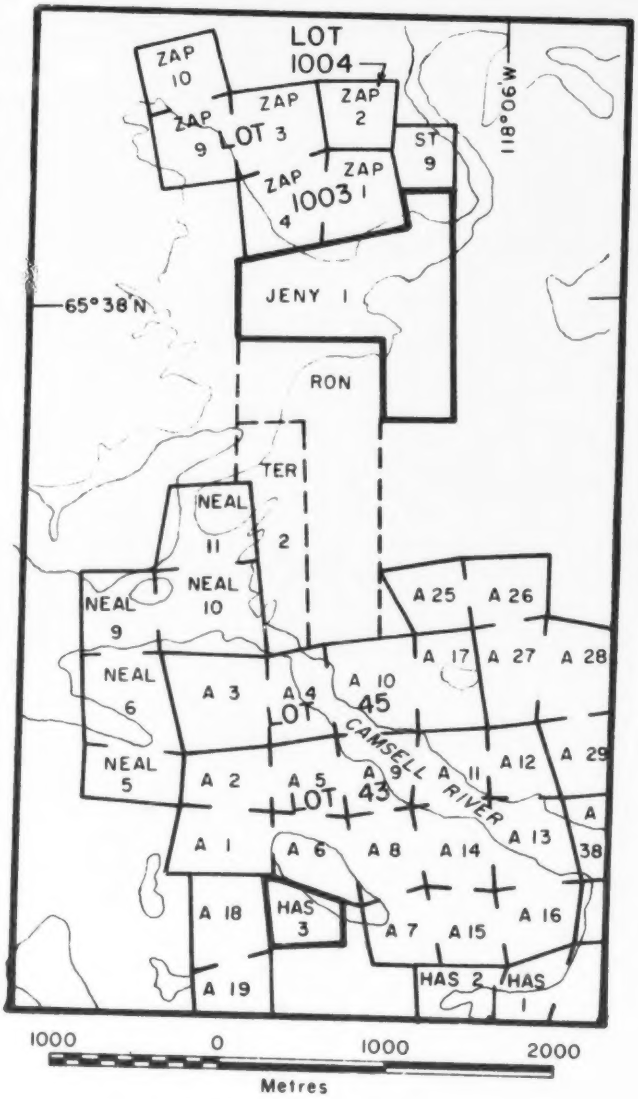

LOT 1004
ZAP 10
ZAP 9
LOT 3
ZAP 2
ZAP 4
LOT 1003
ZAP 1
ST 9
118°06'W
65°38'N
JENY 1
RON
TER 2
NEAL 11
NEAL 10
NEAL 9
NEAL 6
NEAL 5
A 25
A 26
A 17
A 27
A 28
A 3
A 4
LOT 45
A 10
A 29
A 2
A 5
A 9
LOT 43
A 11
A 12
CAMSELL RIVER
A 1
A 6
A 8
A 14
A 13
A 38
A 18
HAS 3
A 7
A 15
A 16
A 19
HAS 2
HAS 1
1000
0
1000
2000
Metres

FIGURE 7-5: Location JENY 1 and HAS 3 claims relative to nearby properties

JENY 1 CLAIM

Terra Mines Ltd.	Silver
202, 7608 - 103 St.	86 E/9 NE
Edmonton, Alta., T6E 4Z8	65°38'N, 118°07'W

REFERENCES

Gibbins and others (1977); Hildebrand (1984); Seaton (1981); Seaton and Hurdle (1978).

DIAND assessment reports 081576, 060426.

PROPERTY

JENY 1.

LOCATION

The claims (Figs. 7-3, 7-5) are 405 km northwesterly of Yellowknife.

HISTORY

Trenching and mapping have been done intermittently on the property since at least as early as the mid-1960's. It was staked by Indian Mountain Metal Mines Ltd. in 1966 as part of the X claim group and restaked as part of the AN group in 1968. Bitter Creek Mines Ltd. held the property in the late 1960's and early 1970's. In 1973 the ground was covered by the MR, ZAP and BIDA 6 claims and later in the 1970's by the ZAP and ST claims (Seaton, 1981; Seaton and Hurdle, 1978; Gibbins and others, 1977). JENY 1 was recorded in September of 1980.

DESCRIPTION

The regional geology is shown in Figure 7-3. Hildebrand (1984) provides a more detailed and up-to-date map at 1:50,000.

CURRENT WORK AND RESULTS

Two man-days were spent during 1982 in cursory geological mapping and in sampling an old trench. Samples were analysed for silver, copper, bismuth, nickel, lead and zinc. Rocks mapped on and adjacent to the property included calcareous argillite, limey chert, siltstone and gritstone, sandy tuff and gabbro.

CONJUROR BAY, BALACHEY AND RAINY LAKES PROJECT

Procan Exploration Company Ltd.	Silver
880 Guiness House	86 E/9, 86 F/12
727 - 7th Ave. S.W.	65°38'N, 118°00'W
Calgary, Alta., T2P 0Z5	

REFERENCES

Caine and others (1981); Hildebrand (1984); Lord (1941, 1951); Padgham and others (1975); Seaton (1978); Seaton and Hurdle (1978); Thorpe (1972).

DIAND assessment reports 081681, 081711.

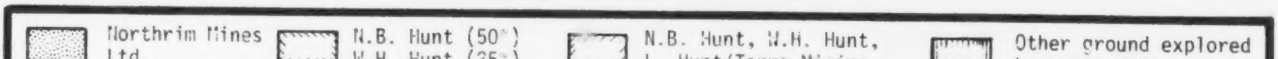

Northrim Mines Ltd.
N.B. Hunt (50%)
W.H. Hunt (25%)
L. Hunt (25%)
N.B. Hunt, W.H. Hunt, L. Hunt/Terra Mining and Expl. Ltd.
Other ground explored by agreements
118°00'W
CONJUROR BAY
BALACHEY LAKE
LOT 1004
65°38'N
SILVER BEAR MINE
RAINY LAKE
CAMSELL RIVER
PROCAN TERRA PROPERTY BOUNDARY
NOREX MINE
SMALLWOOD MINE
NORTHRIM MINE
1 0 3 Km
PROPERTIES
1 BARRY, FRED, WAYNE
2 LK 1
3 STANGE 1,2
4 WOLF
5 CR 2
6 LARRY
7 GLADYS
8 MANDY
9 CATHY 1,2, 5-12
10 CATHY 13-16
11 CATHY 17
12 HERBIE 1
13 A25-38
14 TER 1
15 ST 9
16 JM 5
17 JM 4
18 JM 6
19 CR 1
20 JM 1
21 JM 3
22 LUV 1
23 DM 2,3,6,7
24 JM 2
25 JERI
NOTES: 1 A25-38 recorded in June 1952 by McNeice and Blanchet
2 Centre of project area is roughly 395 km northwesterly of Yellowknife

FIGURE 7-6: Conjuror Bay Project; claims, ownerships and nearby mines

PROPERTY

The claims are listed in Table 7-1.

LOCATION

The project area (Figs. 7-3, 7-6) lies between Rainy Lake and Balachey Lake, both of which are on the Camsell River, and Conjuror Bay of Great Bear Lake. The centre of this area is 400 km northwesterly of Yellowknife.

PROPERTY

The claims and their ownerships are listed in Table 7-1 and shown in Figure 7-6.

HISTORY

The area has been explored and prospected since the 1940's. A general view of the history of the project area may be obtained in Lord (1941, 1951); Padgham and others (1975); Seaton (1978); Seaton and Hurdle (1978); Thorpe (1972) and from the numerous assessment reports listed by Caine and others (1981).

The dates on which the various claims were recorded are shown in Table 7-1.

DESCRIPTION

The regional geology is shown in Figure 7-3. The geology of the Rainy Lake and White Eagle Falls area is shown in more detail by Hildebrand (1984).

CURRENT WORK AND RESULTS

In 1983 the claims listed in Table 7-1 and certain adjoining ground were explored by prospecting, lithogeochemical sampling and geochemical soil sampling. Between 300 and 400 rock samples and a similar number of soil samples were collected. Of these, between 200 and 300 each of rock and soil samples were collected on the claims listed in Table 7-1, and the remainder from adjacent properties which include claims LK 1, LM 1-8, WOLF 3-5, 6-8 and A 25-38. Approximate sample density on each claim expressed as hectares per sample is also shown in Table 7-1 and indicates a concentration of work on the JM 4, on the DM and LUV, on the ST 9 and on several claims north and northwest of Northrim Mine. Distribution of sampling within individual claims is by no means even and tends to be localized along and

TABLE 7-1:CLAIM, OWNERSHIP AND SAMPLING DATA FOR CONJUROR BAY PROJECT

CLAIM	DATE RECORDED	AREA (ha) (APPROXIMATE)	OWNER*	APPROXIMATE AREA PER SAMPLE (ha) ROCKS	SOILS
BARRY	MAY 14, 1982	11			
FRED	MAY 14, 1982	164		1:100	
WAYNE	MAY 14, 1982	17			
STRANGE 1-2	AUG 03, 1982	42		1:7	1:14
LARRY 1-2	JUL 15, 1974	42	Northrim Mines Ltd.	1:7	
GLADYS 1-2	JUL 15, 1974	42	Northrim Mines Ltd.	1:7	1:7
MANDY 1-3	JUL 15, 1974	53	Northrim Mines Ltd.		
HERBIE 1	NOV 01, 1982	16			
CATHY 1-2 5-12	JUL 17, 1975	209		1:17	1:100
CATHY 13-17	SEP 25, 1975	105		1:7	1:8
TER 1	AUG 27, 1979	968		1:25	1:14
JERI	DEC 12, 1981	815	N.B. Hunt, W.H. Hunt, L. Hunt/ Terra Mining and Exploration Ltd.	1:50	1:33
ST 9	MAR 22, 1976	21		1:7	1:35
JM 1	FEB 11, 1981	125		1:13	1:100
JM 2	FEB 11, 1981	376	N.B. Hunt, W.H. Hunt, L. Hunt/ Terra Mining and Exploration Ltd.	1:100	
JM 3	FEB 11, 1981	84		1:25	1:9
JM 4	FEB 11, 1981	84		1:1.5	1:2
JM 5	FEB 11, 1981	397		1:>100	1:100
JM 6	FEB 11, 1981	376		1:>100	1:8
CR 1	MAR 21, 1983	418		1:>100	
CR 2	MAR 21, 1983	502		1:25	1:33
DM 2-3, 6-7	JUL 07, 1975	84		1:10	1:3
LUV 1	APR 22, 1982	42		1:4.5	1:2

* Unless otherwise indicated, mineral claims are owned by N.B. Hunt (50%), W.H. Hunt (25%), L. Hunt (25%).

* 1:25 = 1 sample per 25 ha.

around veins and gossans. Old trenches were also sampled.

All rock samples were assayed for copper and silver and selected rock samples were also analysed for one or more of arsenic, gold, lead and zinc. Soil samples were analysed for copper, silver and arsenic.

Veins within the project area were reported to be of three types: barren quartz veins and stockworks, veins containing alternately banded cherty quartz with usually greater amounts of coarse-grained carbonate, and veins consisting predominantly of quartz with lesser amounts of fine-to-medium-grained carbonate. Silver-bearing minerals were noted only in mainly quartz-bearing veins at the Borthwick Shaft of Northrim Mine on the LM 1-8 mining lease. Concentrations of several percent copper, as chalcopyrite or less commonly bornite, were found locally in veins containing alternate layers of quartz and carbonate. Geochemically anomalous but not economically significant silver concentrations were found with chalcopyrite and bornite. Veins were found to be poorly developed within gossan-capped sulphide zones and within the magnetite-apatite-actinolite and the albite alteration zones of the Balachey Pluton. These zones (Hildebrand, 1984) underlie much of the eastern part of the property to the east of a narrower pyrite-chalcopyrite zone which trends northwesterly through the central part of the project area, and which underlies the Northrim, Norex and Smallwood Mines.

HIL, JIM, KIM AND SIP CLAIMS

B. P. Canada Inc.
Selco Mining & Minerals Div.
1700 - 55 University Ave.
Toronto, Ont., M5J 2H7

Uranium, Copper
86 K/5
66°22'N, 117°45'W

REFERENCES

Caine and others (1981); Hildebrand (1983a); Hoffman (1978); Seaton (1981, 1983a,b).

DIAND assessment report 081624.

PROPERTY

HIL 1-12; JIM 1-15; KIM 1-34; SIP 1-22.

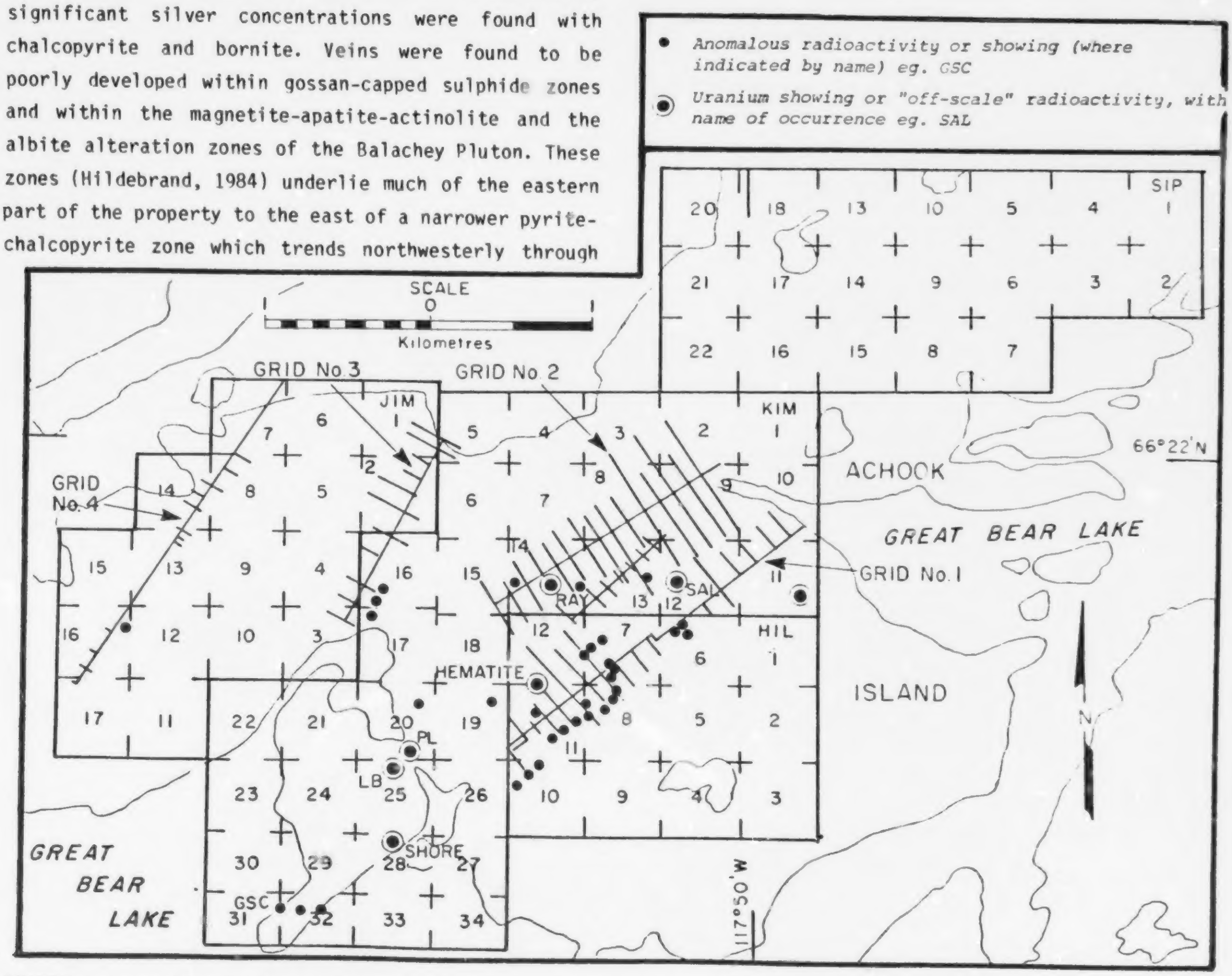

● Anomalous radioactivity or showing (where indicated by name) eg. GSC
◉ Uranium showing or "off-scale" radioactivity, with name of occurrence eg. SAL
SCALE
0
Kilometres
GRID No.3
GRID No.2
GRID No.4
GRID No.1
JIM
KIM
HIL
SIP
ACHOOK
ISLAND
GREAT BEAR LAKE
GREAT BEAR LAKE
66°22'N
117°50'W
N
RAY
SAL
HEMATITE
PL
LB
SHORE
GSC

FIGURE 7-7: Grids, uranium showings and occurrences of anomalous radioactivity on HIL, JIM, KIM and SIP claims.

LOCATION

The claims are on Achook Island in the McTavish Arm of Great Bear Lake, 480 km north-northeasterly of Yellowknife (Figs. 7-3, 7-7).

HISTORY

The exploration history of the claims was reviewed by Seaton (1981, 1983a,b). Relevant assessment reports are listed by Caine and others (1981). The HIL, JIM and SIP claims were staked in 1977 and the KIM claims in 1978.

DESCRIPTION

The regional geology is shown in Figure 7-2 and in much revised, more detailed form by Hoffman (1978) at 1:125,000. Hildebrand (1983a) has mapped and compiled the geology of the Echo Bay - MacAlpine Channel area. The compilation is at 1:50,000.

The property is underlain mainly by andesitic to rhyolitic lava flows and ignimbrites of the Labine Group. Smaller areas are underlain by volcaniclastics and the intrusive Mulligan Porphyry, and the southwest corner of the property is underlain by granodiorite of the Hogarth Pluton (Hoffman, 1978).

A fault forms splays that diverge southwesterly through the claims to converge with a zone of subparallel northeasterly striking faults in the western part of the property. From 1977 to 1979, several small uranium-copper showings and numerous radioactive occurrences were found on the property (Fig. 7-6). They are found at or close to northeasterly trending photo-indicated lineaments or faults.

CURRENT WORK AND RESULTS

During 1982, Grid No. 2 (Fig. 7-7) was laid out and explored by geological mapping and a radiometric survey. The grid was designed to cover two northeasterly trending faults that cut rhyolite flows and volcaniclastic conglomerate north of the previously trenched Rhyolite Showing.

New showings of uranium and copper minerals were found on the northern and southern margins of Grid No. 2. Four radioactive occurrences with no visible uranium minerals were also found.

AMUNDSEN BASIN - WOPMAY OROGEN

That part of the Amundsen Basin with which this report is concerned lies to the north of Great Bear Lake and is underlain by Helikian strata of the Hornby Bay and Dismal Lakes Groups (Fig. 7-1). The Hornby Bay Group comprises mainly fluvial to deltaic deposits, whereas the Dismal Lakes Group is composed mainly of marine carbonates and supratidal to tidal siliclastics.

Inliers of Aphebian granitoids and volcanics of the Woomay Orogen are locally exposed and flanked by rocks of the Dismal Lakes or Hornby Bay Groups. The Aphebian-Helikian unconformity has been intensively explored for uranium, as has the area underlain by the basal unit of the Dismal Lakes Group, which hosts the Mountain Lake uranium deposit. Stratigraphy, tectonics and depositional history of the Hornby Bay and Dismal Lakes Groups have been described by Kerans and others (1981).

HORNBY BAY PROJECT (SOUTH)

PAT CLAIMS	Uranium
B. P. Canada Inc.	86 J/12
Selco Mining & Minerals Division	60°40'N, 115°50'W
1700 - 55 University Ave.	
Toronto, Ont., M5J 2H7	

REFERENCES

Caine and others (1981); Easton (1980, 1981); Hoffman (1980a); Hoffman and St-Onge (1981); Hoffman and others (1978, 1980, 1981); Kerans and others (1981); Seaton (1981, 1983a,b, 1984); Seaton and Hurdle (1978); St-Onge and Hoffman (1980).

DIAND assessment reports 081594, 081063.

PROPERTY

PAT 7, 9-14.

LOCATION

The property (Figs. 7-8, 7-9, 7-10) is centered 475 km north-northwesterly of Yellowknife.

HISTORY

The property was staked by B.P. Minerals in 1976. The exploration history of the claims and adjacent properties was summarized by Seaton (1981, 1983a,b, 1984) and by Seaton and Hurdle (1978). DIAND assessment report 080924 (listed by Caine and others, 1981) records geological and geochemical surveys of the property performed in 1978. An airborne Input EM and magnetometer survey flown in 1979 covered the whole project area west of Speers and McGregor Lakes (DIAND assessment report 081063).

DESCRIPTION

Figure 7-8 shows the regional geology at 1:1,000,000. NTS sheet 86 J has been remapped by Hoffman and others (1978, 1981). Kerans and others

(1981) mapped the Helikian Hornby Bay Group and Dismal Lake Group sediments and described their stratigraphy, sedimentation and tectonism. An outlier of these Hornby Bay Group sediments underlies part of the property. Various structural, stratigraphic and geochemical aspects of the rocks of the Wopmay Orogen pertinent to the property and its surrounding area are discussed in Easton (1980, 1981), Hoffman (1980a), Hoffman and St-Onge (1981), Hoffman and others (1980) and St-Onge and Hoffman (1980).

CURRENT WORK AND RESULTS

In 1982 a 45 line-km grid (the Bluto South Grid) was established to investigate a uranium-copper lake-sediment anomaly found in 1980 at what is informally called Anomaly Lake (Fig. 7-9). The grid was geologically mapped. Hornby Bay Group sediments, sparsely outcropping, were found on the eastern shore of Anomaly Lake. Elsewhere on the Bluto South Grid bedrock is almost entirely hidden by hummocky moraine. The few outcrops in the area and the topographic characteristics suggest the moraine is underlain by a locally fault-bounded outlier of Hornby Bay Group sediments. Northwest of the Zephyr Fault (referred to by B.P. Minerals' geologists as the Perrault Lake Fault) granodiorite gneiss outcrops abundantly.

The Bluto South Grid was explored by collecting 596 soil samples, which were analysed for uranium, copper, nickel and numerous other elements.

Several uranium anomalies, which for the most part are wholly or in part coincident with various base metal anomalies, form a westerly trending zone crossing the grid from the south end of Anomaly Lake to the Zephyr Fault at the grid's northwestern margin.

The property was explored by radiometric prospecting.

Additional uranium showings were not found on the Bluto South Grid or elsewhere on the property during radiometric prospecting in 1982.

HORNBY BAY PROJECT (NORTH)

B. P. Canada Inc.	Uranium
Selco Mining & Minerals Div.	66°45'N to 66°58'N
1700 - 55 University Ave.	115°27'W to 116°00'W
Toronto, Ont., M5J 2H7	

REFERENCES

Hoffman and St-Onge (1981); Hoffman and others (1978, 1981); Kerans and others (1981); McGlynn (1977); Seaton (1981, 1983a,b, 1984); Seaton and Hurdle (1978).

DIAND assessment reports 081648, 081063.

PROPERTY

U 20-22, 26, 29, 31, 35, 43, 48, 54; C 17.

LOCATION

The claims are 485 km to 505 km north-northwesterly of Yellowknife and are but a few of a much larger number of Hornby Bay Project claims (Figs. 7-8, 7-10). Details on individual claims and groups of claims (within the larger Hornby Bay Project claim block) on which work was done in 1982 are listed below:

CLAIMS	NTS	LAT. N.	LONG. W.	REMARKS
U 43	86 J/13	66°45.0'	115°43'	Five km south of Coppermine River.
U 48, 54	86 J/13	66°49.5'	115°55'	U 48 straddles Coppermine River.
U 20, 21	86 J/13	66°53'	115°52'	Three km north of Contact Lake, where 17 holes were drilled in 1980.
U 22, 26, 29, 31.	86 J/13	66°52.5'	115°40'	From 2 km to 8 km northeast of Coppermine River.
C 17, U 35	86 J/13,14	66°44'	115°30'	Four km northeast of Coppermine River.

Note that the Hornby Bay Project includes the PAT claims on 86 J/12 (pgs. 266-267 of this report) and previously included the Bear Valley Project claims on 86 J/13, 14 and 86 O/3 (pg.273-282 of this report) as well as the EAST claims on 86 J/10, 11.

HISTORY

The claims were recorded by Union Carbide of Canada Ltd., a joint venture partner on the Hornby Bay Project; the U claims in April, 1979 and the C 17 in October, 1979.

The history of exploration of the Hornby Bay Project claims, and of exploration prior to staking has been reviewed by Seaton (1981, 1983a,b, 1984). A 1979 airborne Input EM and magnetometer survey (DIAND assessment report 081063) covered the entire Hornby Bay Project area (Fig. 7-10).

DESCRIPTION

The regional geology is shown in Figure 7-8. Hoffman and others (1978, 1981) have remapped the area since the publication of McGlynn's (1977) compilation on which Figure 7-8 is based. Kerans and others (1981) have mapped and described the Helikian Hornby Bay Group sediments underlying parts of NTS sheets 86 J, K, L, M, N and O.

Additional references for the Hornby Bay Project dealing with specific aspects of the regional

LEGEND

GEOLOGY

HADRYNIAN	Hb	Gabbro sills and sheets. Includes Coronation and Franklin intrusions.
		RAE GROUP
	${}_{R}\mathrm{Hssp}^{1}$	Sandstone, siltstone, shale
	${}_{R}\mathrm{Hs}$	Rae Group undivided
HELIKIAN		COPPERMINE RIVER GROUP
	${}_{C}\mathrm{Hb}$	HUSKY CREEK FORMATION: red sandstone and siltstone, intercalated basaltic flows
	HbM	Muskox Intrusion
	${}_{C}\mathrm{Hvb}$	COPPER CREEK FORMATION: basaltic flows, minor sandstone
		DISMAL LAKE GROUP
	${}_{D}\mathrm{Hc}^{4}$	Laminated dolomite
	${}_{D}\mathrm{Hc}^{3}$	Massive dolomite
	${}_{D}\mathrm{Hc}^{2}$	Laminated dolomite
	${}_{D}\mathrm{Hc}^{1}$	Dolomite, red mudstone
	${}_{D}\mathrm{Hss}$	Sandstone, black shale
	${}_{D}\mathrm{Hs}$	Dismal Lake Group undivided
	Hb	Muskox Intrusion and gabbro sills and dykes
		HORNBY BAY GROUP
	${}_{H}\mathrm{Hss}^{2}$	Sandstone, minor conglomerate
	${}_{H}\mathrm{Hssp}$	Sandstone, siltstone, shale
	${}_{H}\mathrm{Hc}$	Dolomite
	${}_{H}\mathrm{Hss}^{1}$	Sandstone, minor conglomerate
	${}_{H}\mathrm{Hs}$	Hornby Bay Group undivided
APHEBIAN		GREAT BEAR BATHOLITH
	Ad	Granodiorite, quartz monzonite, granite
	${}_{E}\mathrm{Apwv}$	Eastern sequence: greywacke mudstone turbidites, quartzite, shale, arkose, ash flow tuffs, basalts
	${}_{C}\mathrm{Avps}$	Central sequence: intermediate to acidic ash flow tuffs, air fall tuffs with minor interbedded volcanogenic sedimentary rocks
	${}_{U}\mathrm{Av}$	Volcanic flows and tuffs, sedimentary rocks, felsite intrusions undivided
		HEPBURN METAMORPHIC-PLUTONIC BELT
	Ag	Granodiorite, quartz monzonite, granite
	An	Migmatite, veined gneiss, granitic gneiss, includes undifferentiated metamorphosed Snare or Epworth rocks
		EPWORTH GROUP
	${}_{E}\mathrm{Asdr}$	Metamorphosed Epworth rocks
	${}_{E}\mathrm{Apw}$	RECLUSE FORMATION: argillite, shale, greywacke turbidites
	${}_{E}\mathrm{Ac}$	ROCKNEST FORMATION: dolomite
	${}_{E}\mathrm{Assp}$	ODJICK FORMATION: sandstone, shale, mudstone
	${}_{E}\mathrm{Abvc}$	Basalts, dolomite

PROPERTIES

① PAT 7, 9-14 claims

② U 43

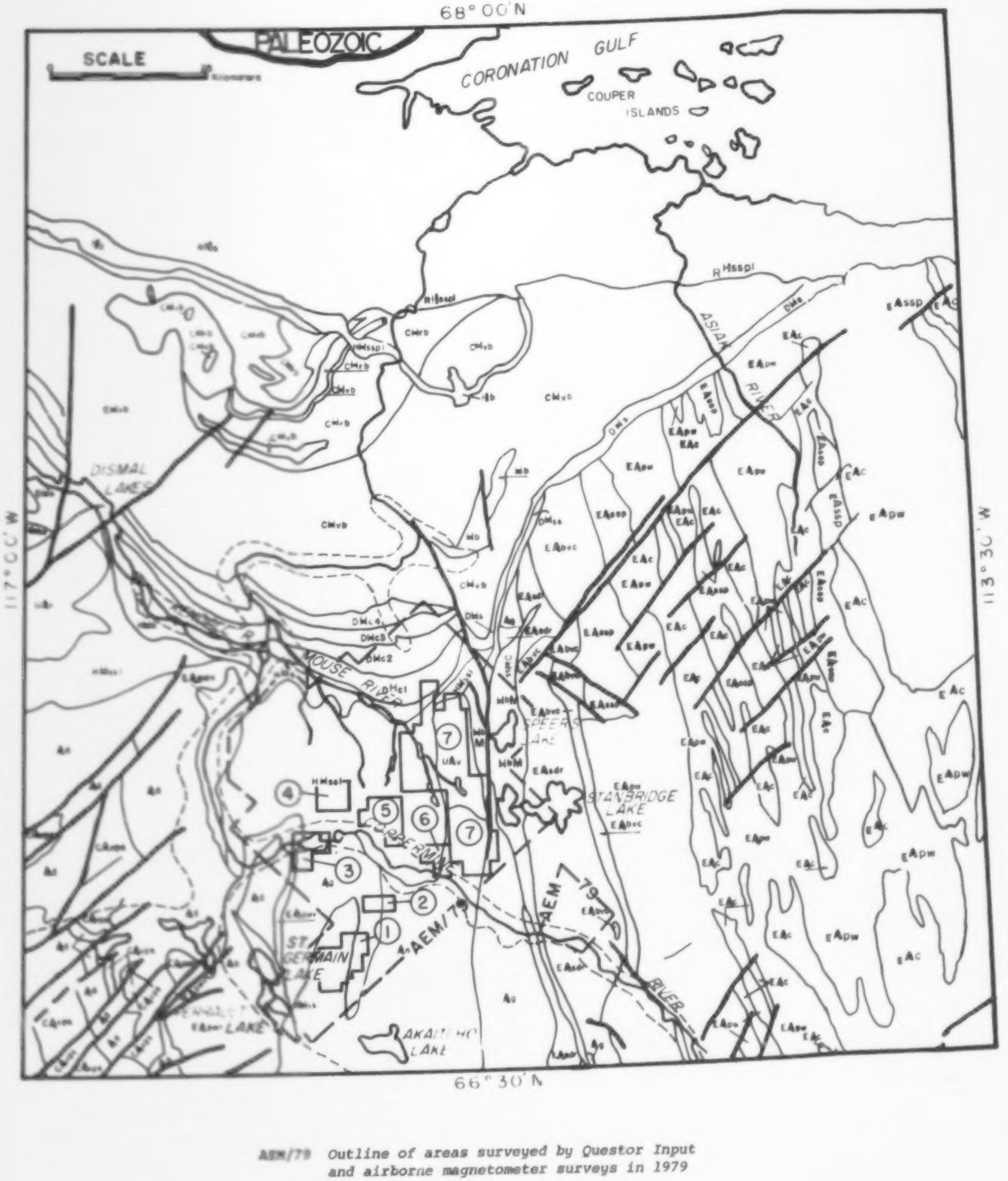
③ U 48, 54

④ U 20, 21

⑤ U 22, 26, 29, 31

⑥ C 17, U 35

⑦ Bear Valley Project


68° 00'N
66° 30'N
117° 00' W
113° 30' W
SCALE
PALEOZOIC
CORONATION GULF
COUPER ISLANDS
DISMAL LAKES
ASIAK RIVER
MOUSE RIVER
COPPERMINE
SPEERS LAKE
STANBRIDGE LAKE
ST. GERMAIN LAKE
AKAITCHO LAKE
RIVER
AEM/79
AEM 79
1
2
3
4
5
6
7
7
EAc
EApw
EAssp
CMvb
DMs
HMssl
Ao

AEM/79 Outline of areas surveyed by Questor Input and airborne magnetometer surveys in 1979

FIGURE 7-8: Asiak and Coppermine Rivers, Coronation Gulf and Dismal Lakes (east). Geology from McGlynn, (1977)

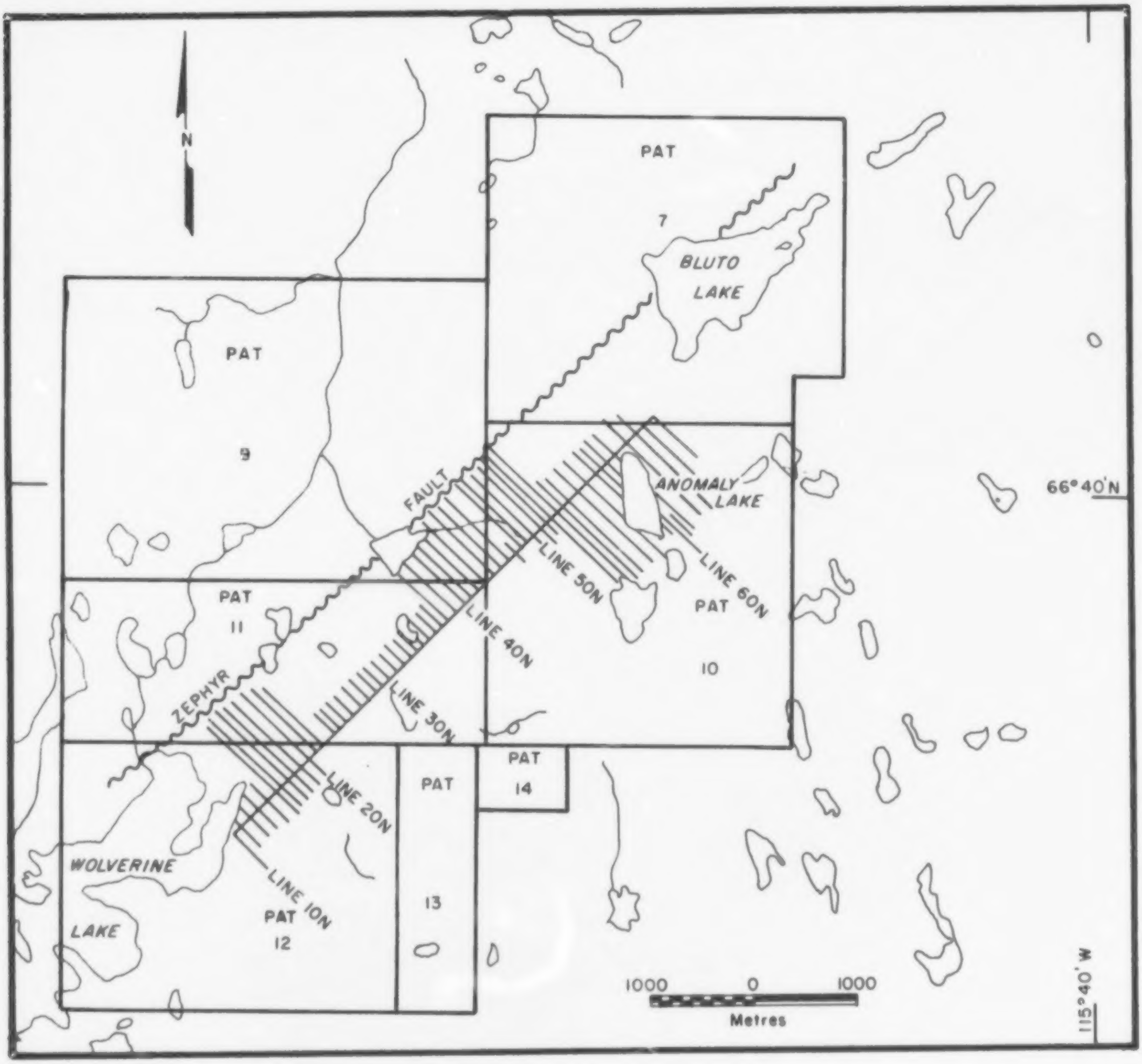

N
PAT
7
BLUTO
LAKE
PAT
9
FAULT
ANOMALY
LAKE
66° 40'N
PAT
11
ZEPHYR
LINE 50N
LINE 60N
LINE 40N
PAT
10
LINE 30N
PAT
14
PAT
LINE 20N
WOLVERINE
LINE 10N
PAT
12
13
LAKE
1000
0
1000
Metres
115°40'W

FIGURE 7-9: PAT 7 and PAT 9-14 claims. Grid layout.

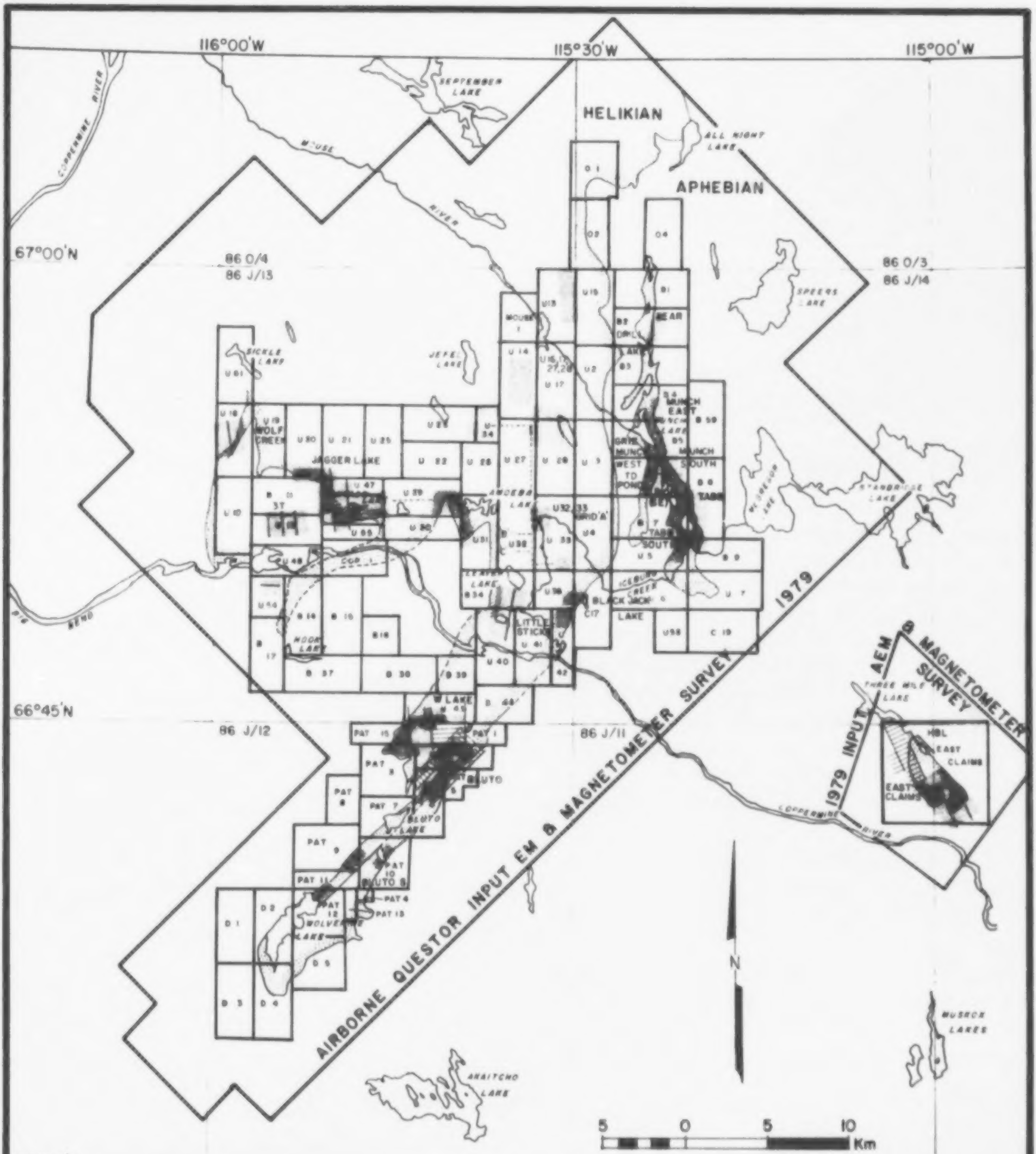

116°00'W
115°30'W
115°00'W
67°00'N
66°45'N
66°30'N
86 O/4
86 J/13
86 O/3
86 J/14
86 J/12
86 J/11
HELIKIAN
APHEBIAN
SEPTEMBER LAKE
ALL NIGHT LAKE
SPEERS LAKE
COPPERMINE RIVER
MOUSE RIVER
SICKLE LAKE
JEFE LAKE
WOLF CREEK
JAGGER LAKE
AMOEBA LAKE
BIG BEND
HOOK LAKE
LITTLE STICK
BLACK JACK LAKE
ICEBURG CREEK
MUNCH EAST
MUNCH SOUTH
MUNCH WEST
TD POND
TABB
TABB SOUTH
BEAR
DRILL
STANBRIDGE LAKE
McGREGOR LAKE
W LAKE
PLUTO
PLUTO LAKE
WOLVERINE LAKE
THREE MILE LAKE
HBL EAST CLAIMS
EAST CLAIMS
AKAITCHO LAKE
MUSKOX LAKES
AIRBORNE QUESTOR INPUT EM & MAGNETOMETER SURVEY 1979
1979 INPUT AEM & MAGNETOMETER SURVEY
N
5
0
5
10
Km

FIGURE 7-10: Hornby Bay Project, claims, grids, unofficial locality names and other data. Areas of property underlain by Hornby Bay Group sediments are in part stippled to show trace of Aphebian-Helikian unconformity.

geology are referred to under Hornby Bay Project - PAT claims (p. 266 of this report).

A zone of Input EM conductors in Akaitcho Group rocks (Hoffman and others, 1981) can be traced south-southwesterly from west and north of Contact Lake across U 48 on the Coppermine River and the U 54 claim, and thence southward onto claim B 17, which adjoins and lies south of U 54. In the Contact Lake area these conductors are known to be caused by graphite.

CURRENT WORK AND RESULTS

U 43 CLAIM

In 1982 a 13.1 line-km grid (the W Lake Grid) in the south-central part of claim U-43 (Fig. 7-10) was explored by geological mapping and soil sampling.

Geological mapping showed the central part of the grid to be mainly underlain by quartz adamellite gneiss, of possible Archean age, interlayered sparsely with amphibolite. This map unit is in contact in the northwestern quarter of the grid with an amphibolite unit, that contains minor amounts of hornblende-quartz-biotite schist. The quartz adamellite and amphibolite units together are flanked to the northwest and southwest, and to the south on claim PAT 1 by Hornby Bay Group paleotalus conglomerate and lithic arkosic sandstone. To the northeast the adamellite and amphibolite outcrops are flanked by till, which according to B.P. Minerals interpretation (based on the recessive nature of the till covered area and sparse outcrops beyond the gridded area), is probably underlain by Hornby Bay Group sediments.

The Hawk Showing consists of pitchblende hosted by rocks of the adamellite gneiss unit about 20 m southeast of the contact between this unit and the amphibolite unit. The Storm Showing consists of radioactive boulders roughly 670 m southwesterly of the Hawk Showing. The three radioactive erratics of the Storm Showing include one which contained pitchblende-bearing veinlets and from which a sample that assayed 3% uranium was obtained.

One hundred and twenty two soil samples were collected at 100 m intervals along lines 100 m apart. The samples were analysed for uranium, copper, lead, zinc, nickel and numerous other elements. The pH of all samples and background radioactivity at each sampling site was determined.

The soil sampling delineated several uranium and uranium-base metal anomalies near the Storm Showing. Uranium, base metal and lithophile element anomalies, both discrete and coincident were found along a north-northwesterly trending lineament crossing adamellite gneiss and amphibolite about 100 m east of the Hawk Showing.

U 48, 54 CLAIMS

A 14 line-km grid (the Coppermine River Grid) in the northern and northeastern part of U 54 was explored in 1982 by geological mapping and by the collection of 139 soil samples at 100-m intervals.

Geological mapping showed that outcrops are found only in the southern part of the grid. These are of dolomite or marble and biotite-amphibole-quartz schist, which occur as alternating north-northeasterly trending units. Graphite was not found - in contrast to the Contact Lake area - although three of the Input EM conductors cross the grid. Scarcity of outcrop may be the reason the conductors were not traced to graphite. Air photos suggest that claim U 48 is probably entirely covered by Pleistocene glacial deposits.

Soil samples were collected and analysed for uranium, copper, lead, zinc, nickel and numerous other elements and the pH of samples determined.Three uranium anomalies were outlined and are coincident with anomalous base metal concentrations. One uranium anomaly is in a bog near outcrops of biotite-amphibole-quartz schist and two, which are in till covered areas, are close to Input EM conductors. Besides uranium anomalies a few discrete base metal anomalies were delineated.

U 20, 21 CLAIMS

A 21.8 line-km grid, in the south of claim U 20 and southwest part of U 21 and which adjoins and lies north of the Contact Lake Grid, was explored in 1982 by the collection of 219 soil samples. The samples were collected at 100-m intervals along lines 100 m apart, and analysed for uranium, copper, lead, zinc, nickel and numerous other elements. The pH of all samples was determined.

A uranium anomaly with coincident base metal anomalies that trends north-northwesterly parallel to regional faults mapped south of Jagger Lake was outlined.

U 22, 26, 29, 31 CLAIMS

In 1982, a 46.9 line-km grid, the Amoeba Lake

Grid (Fig. 7-10) was explored by collecting 490 soil samples at 100-m intervals along lines 100 m apart and in part by geological mapping. Soil sampling and mapping were designed to investigate a copper lake-sediment anomaly discovered in 1976 in a lake informally called Shrimp Lake which is situated about 800 m east of the north-northeasterly trending Monocline Fault. Soil samples were analysed for uranium, copper, lead, zinc, nickel and numerous other elements. The pH of all samples was determined.

Anomalous concentrations of uranium and other metals were outlined mainly in the southeastern part of claim U 29, southwesterly of Shrimp Lake and mainly east of the Monocline Fault in an area mainly underlain by granodiorite gneiss and amphibolite.

C 17, U 35 CLAIMS

In 1982 an 18.6 line-km grid, the Blackjack Lake Grid, was established. The 1.19 sq-km grid lies half on claim C 17 and half on claim U 35 (Fig. 7-10).

The grid was explored by geological mapping and by collecting 150 soil samples at 100-m intervals. The samples were analysed for uranium, copper, lead, zinc, nickel and numerous other elements. The pH of each sample was measured.

Mapping showed that felsic tuffs and felsic flows of the Akaitcho Group outcrop in the eastern 30% of the grid. The remaining 70% of the grid is devoid of outcrop, but has been interpreted to be underlain by Hornby Bay Group sandstone under a thin till cover. A northeasterly trending scarp between Blackjack and Falcon's Lake has been interpreted as a fault, along which the Akaitcho Group rocks are in contact with the recessive Hornby Bay Group sandstone. The soil sampling survey outlined a uranium anomaly and coincident multi-element anomaly along the interpreted fault in the northeastern part of the grid.

BEAR VALLEY PROJECT

Anaconda Canada Expl. Ltd.	Uranium
1600, 1500 W. Georgia St.	86 J/13,14; 86 O/3
Vancouver, B.C., V6G 2Z6	66°50'N,115°25'W

REFERENCES

Easton (1980); Hoffman (1980a); Hoffman and St-Onge (1981); Hoffman and others (1978, 1981); Kerans and others (1981); Seaton (1981, 1983a,b, 1984); Seaton and Hurdle (1978); St-Onge and Hoffman (1980).

DIAND assessment reports 081701, 081730.

PROPERTY

B 1-9, C 19, MOUSE 1, O 1-4, U 1, 2, 5-7, 15-17, 53, 59.

LOCATION

The property is at Munch Lake (Figs. 7-8, 7-10 to 7-15), an informal name which, like many others used to describe lakes, grids and showings on the property, reflects the disagreeable interaction of grizzly bears and geologists. Munch Lake is 505 km north-northwesterly of Yellowknife. Figures 7-11 to 7-15 show individual claim locations.

HISTORY

B.P. Minerals Ltd. recorded O 1-4 in April of 1978 and the MOUSE 1 claim in May of 1981. The B, C and U claims were recorded by Union Carbide of Canada Ltd., a joint venture partner of B.P. Minerals, as part of the Hornby Bay Project block of claims. The B, C and U claims were recorded in April of 1979, except for the C 17 and U 59 claims, which were recorded in October of 1979.

The history of exploration to 1981, both prior and subsequent to staking, has been reviewed by Seaton (1981, 1983a,b, 1984) and by Seaton and Hurdle (1978). Figure 7-11 shows grids established by B.P. Minerals and areas drilled from 1978 to 1980.

In 1982, Anaconda Canada Exploration joined B.P. and Union Carbide to become operator in a new joint venture for the Bear Valley portion of the Hornby Bay Project.

DESCRIPTION

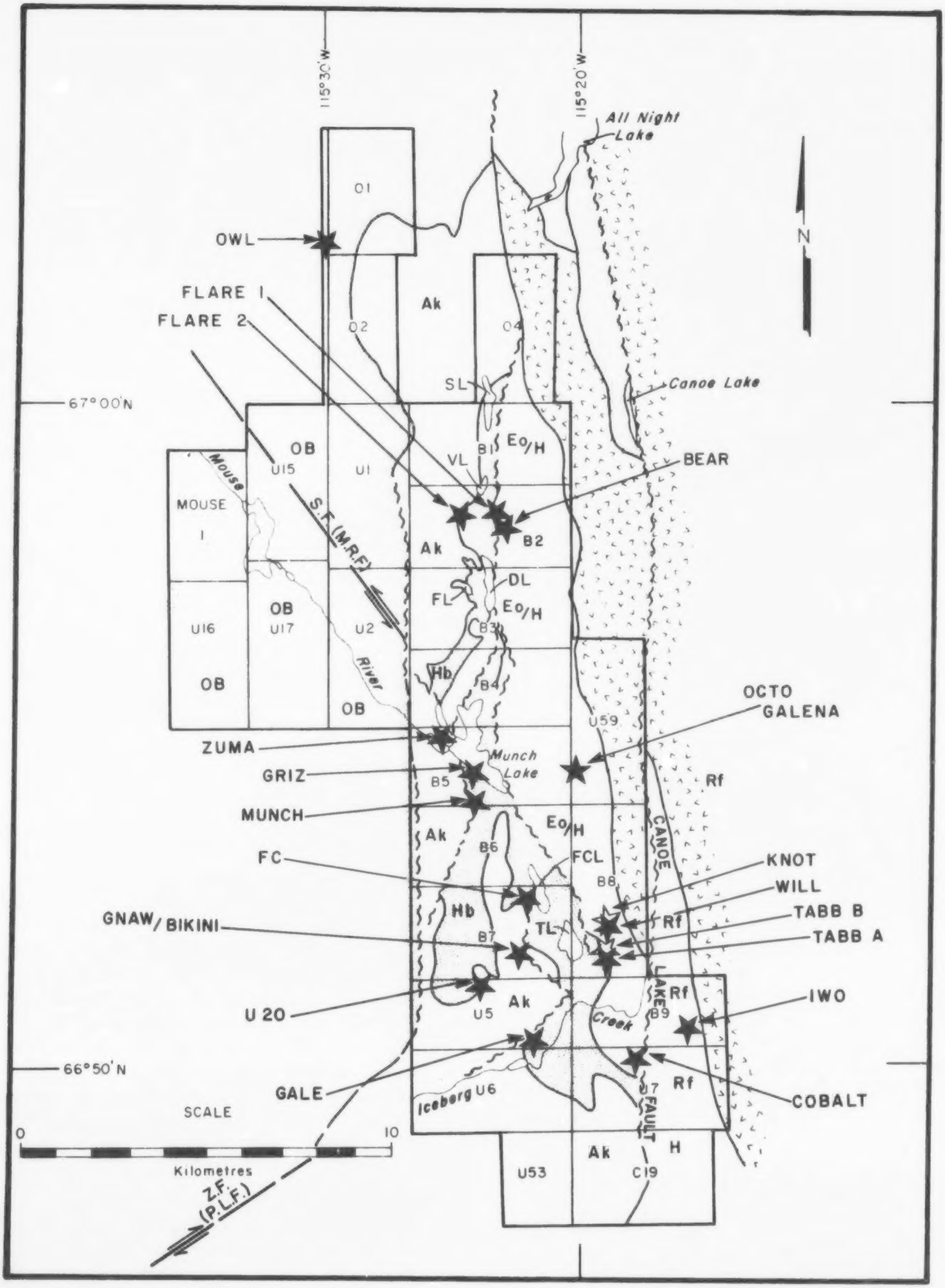
The regional geology is shown in Figure 7-10. The area has been remapped by Hoffman and others (1978, 1981). Kerans and others (1981) have mapped and described the Helikian Hornby Bay Group sediments underlying parts of NTS sheets 86 J, K, L, M, N and O.

The geology of the project area was briefly reviewed by Seaton (1984). Specific aspects of the geology were covered by Easton (1980), Hoffman (1980a), Hoffman and St-Onge (1981), Hoffman and others (1980), and St-Onge and Hoffman (1980).

Figure 7-12 shows the locations of the main showings and the general geology of the Bear Valley Project area. The figure is derived mainly from Anaconda's mapping. The geology is considerably simplified and locally modified after Hoffman and others (1981).

CURRENT WORK AND RESULTS

Current work and results are summarised in Tables 7-2, 7-3 and 7-4 and in Figures 7-13, 7-14 and 7-15.


115°30'W
115°20'W
All Night Lake
N
Canoe Lake
67°00'N
66°50'N
O1
O2
O4
Ak
OWL
FLARE 1
FLARE 2
SL
OB
U15
U1
VL
B1
Eo/H
BEAR
MOUSE 1
Mouse
S.F. (M.R.F.)
B2
DL
FL
OB
U16
U17
U2
B3
River
Hb
B4
OB
OCTO GALENA
U59
ZUMA
GRIZ
Munch Lake
B5
MUNCH
Rf
CANOE
FC
B6
FCL
B8
KNOT
WILL
TABB B
TABB A
GNAW/BIKINI
TL
B7
U 20
U5
LAKE
B9
IWO
Creek
GALE
Iceberg
U6
U7
COBALT
FAULT
H
SCALE
0
10
Kilometres
U53
C19
Z.F. (P.L.F.)

LEGEND

OB	Areas largely covered by surficial deposits
▨	Muskox Intrusion
Hb	Hornby Bay Group
H	Hepburn Batholith, intrusive complex
	CORONATION SUPERGROUP
Rf	Recluse Group. Fontano Formation
Eo	Epworth Group. Odjick Formation
Ak	Akaitcho Group

KEY TO LAKES
(Un-official names)

SL	Sno Lake
VL	Valley Lake
DL	Drill Lake
FL	Fire Lake
FCL	FC Lake
TL	Tabb Lake

〰	Faults mapped by Anaconda Canada Exploration Ltd. geologists on Bear Valley Project property.
⫽	Transcurrent faults of regional extent

Z.F. Zephyr Fault. (P.L.F.) Perrault Lake Fault. The Zephyr Fault (Hoffman, 1980 a) is referred to by B.P. Minerals Ltd. geologists as the Perrault Lake fault.

S.F. Sinister Fault. (M.F.R.) Mouse River Fault. The Mouse River Fault of B.P. Minerals geologists is either a splay of or a faulted continuation of the Sinister Fault (Hoffman 1980a).

★	Mineral Showings, with name

FIGURE 7-11: Generalized geology of the Bear Valley Project area and mineral showings.

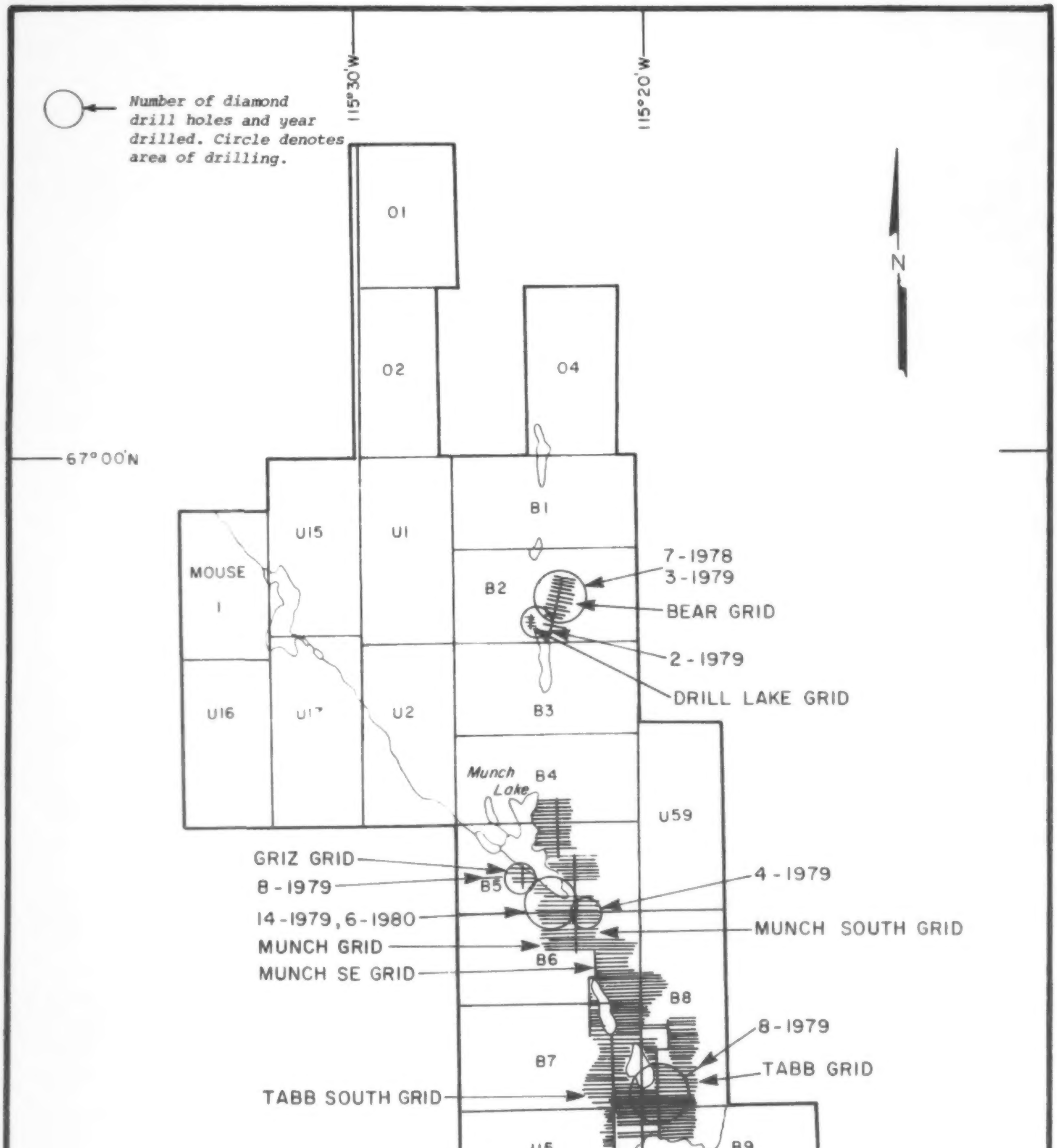

115°30'W
115°20'W
Number of diamond drill holes and year drilled. Circle denotes area of drilling.
N
01
02
04
67°00'N
MOUSE I
U15
U1
B1
7-1978
3-1979
B2
BEAR GRID
2-1979
DRILL LAKE GRID
U16
U17
U2
B3
Munch Lake
B4
U59
GRIZ GRID
8-1979
B5
4-1979
14-1979, 6-1980
MUNCH SOUTH GRID
MUNCH GRID
B6
MUNCH SE GRID
B8
8-1979
B7
TABB GRID
TABB SOUTH GRID
U5
B9
66°50'N
U6
U7
SCALE
0
10
Kilometres
U53
C19

FIGURE 7-12: Pre-1982 grids and diamond drilling-Bear Valley Project

TABLE 7-2: SUMMARY OF 1982 EXPLORATION ACTIVITY BEAR VALLEY, N.W.T.

GRID NAME	Line-cutting (Km)	SHOWINGS			GEOCHEMISTRY				GEOPHYSICS (KM)					OVERBURDEN DRILL.				TRACK ETCH	XRD ON BP core	PETROGRAPHY
		NAME SUBGRID	HOST ROCK	Mapped in detail	Soils	Surface Lithogeochem ICP	Surface Lithogeochem Whole Rock	Surface Lithogeochem XRD	VLF - EM	Mag	HLEM	I.P	Chaining	No of holes completed	Total m. drilled	No of till Samples	No of XRD	No. of cups.	No. of samples	No of Thin sections
TABB	62.2				1113	21	6		5.4					25	96.8	72		395		44
		Tabb	Hepburn	✓		5	3													25
		Will	Hepburn	✓		11	2													12
		Knot	Epworth	✓		2														2
		Smoke	Akaitcho	✓		3	1													5
GNAW	54.0				1221	47	21	3	12.3	10.5	5.1	2.9	4.8	6	51.5	26		417	5	48
		Gnaw	Akaitcho	✓		15	9		7.6	4.8	5.1	2.9	4.8							21
		F.C.	Akaitcho	✓		19	9		4.7	4.7										17
		Gale	Hornby	✓		13	3	3		1.0				6	51.5	26			5	9
		Vug	Akaitcho																	1
MUNCH	31.7				52	17	8	5	7.4	4.8	3.8	1.4	4.8	40	262.8	135		236	230	17
		Munch	Hornby			16	7	5											196	10
		Griz	Hornby			1	1												34	7
BEAR	9.8				51	2			2.8	7.0	3.5		4.1	2	21	13		199	4	12
		Bear	Hepburn											2	21	13			4	6
		N Bear	Hepburn							4.1	3.5		4.1							
		S. Bear	Hornby						2.8	2.9										
		Flore I	Akaitcho			1														2
		Flore II	Hornby			1														4
COBALT	17.6				249	14	13		17.2	16.9										23
		Cobalt	Hepburn	✓		12	12													19
		Pipe	Hepburn			2	1													4
OWL	32.7				653	8														6
		N.Owl	Hornby	✓		3														3
		S.Owl	Hornby	✓		5														3
C-19	23				502				20.9	20.8										
MOUSE	28.4								25.8	25.2										
SNOW	4.6								3.3	3.0	2.6		3.9							
NO GRID																				
		Iwo	Epworth			1														3
		U 20	Akaitcho	✓		2														5
		Zuma	Akaitcho			2														3
		Octo Pb	Epworth			3														3
		Iceburg Pb	Epworth			1														
LOCAL						2														19
REGIONAL						2	9													18
TOTAL					3841	122	57	8	95.1	88.2	15	4.3	17.6	73	432.1	246		1247	239	201

TABLE 7-3: SUMMARY OF 1983 EXPLORATION ACTIVITY BEAR VALLEY, N.W.T.

GRID NAME	Line-cutting (Km)	SHOWINGS			GEOCHEMISTRY				GEOPHYSICS (KM)					DIAMOND DRILLING				TRACK ETCH	XRD ON BP core	PETROGRAPHY	RADON TUBES
		NAME SUBGRID	HOST ROCK	Mapped in detail	Soils	Surface Lithogeochem ICP	Surface Lithogeochem WHOLE ROCK	Surface Lithogeochem XRD	VLF - EM	Mag	HLEM	EM-16R	Chaining/Slope Correcting	No of holes completed	Total m. drilled	No of Assays	No of XRD	No. of cups. recovered	No. of samples	No of Thin sections	No replaced
TABE									9.47	12.00		13.09	13.02	9	736	43		351			
		Tabb	Hepburn						9.47	12.00		8.12	13.02	2	233	3					
		Will	Hepburn									4.95		1	73	0					
		Knot	Epworth											5	369	31					
		Smoke	Akaitcho											1	54	9					
GNAW									7.05	18.95	0.80	21.02	3.30	20	1321	36		365			146
		Gnaw	Akaitcho						4.15	10.80		8.90	2.40	11	719	33		195			119
		F C	Akaitcho						2.90	9.15	0.80	13.02	0.90	9	602	3		125			37
		Gale	Hornby															44			
		Vug	Akaitcho																		
MUNCH									6.65	10.00		10.39	0.97	3	330	2		218			101
		Munch	Hornby						6.65	10.00		8.27		3	330	2					35
			Hornby									2.12									66
BEAR									7.75	9.50		10.37	9.50	12	1984	60		193			227
		Bear	Hepburn						7.25	9.50		8.60		5	416	27		193			227
		N Bear	Hepburn						0.50			1.77									
		S Bear	Hornby																		
		Flore I	Akaitcho																		
		Flore II	Hornby											7	632	33					
COBALT									9.00					2	92	4					
		Cobalt	Hepburn																		
		Pipe	Hepburn																		
OWL									5.22	15.65											
		N Owl	Hornby																		
		S Owl	Hornby																		
C-19																					
MOUSE										21.00											
SNOW									4.88	4.88	3.30		3.30								
NO GRID																					
		Iwo	Epworth																		
		U 20	Akaitcho																		
		Zuma	Akaitcho																		
		Octo Pb	Epworth																		
		Iceburg Pb	Epworth																		
LOCAL																					
REGIONAL																					
TOTAL									50.02		4.20	55.77	30.09	46	3566			1037			474

TABLE 7-4 BEAR VALLEY PROJECT. SUMMARY OF 1983 DIAMOND DRILLING.

Hole No.	Depth (m)	Grid	Showing	Target Anomalies/Geological Features
83-1	80.00	Bear	Bear	R./Low, VLF., Bear sh.z. Nearby soils (U.Po.^{210}).
83-2	94.10	Bear	Bear	R./Low, VLF.EM.(MM.)Rad.(Scint.Tr.E.PT.)Soils(U.Po^{210})
83-3	73.00	Bear	Bear	Rad.(scint.)Soils(U.Po210).
83-4	80.00	Bear	Bear	R./Low,VLF.EM.(MM.)Rad.(PT.).
83-5	70.50	Bear	Flare 2	Adjacent to trench on Flare 2 Showing.
83-6	106.00	Bear	Flare 2	Rad.(scint.)anomaly(extension along strike).
83-7	99.95	Bear	Flare 2	R./Low.Rad.
83-8	89.07	Bear	Bear	VLF.EM.(MM.)Rad.(PT.).
83-9	56.00	Bear	Flare 2	Local northerly linear.Drilled towards Rad.(scint.).
83-10	100.00	Munch	Munch	VLF.Rad.(Tr.E.)Soils U.
83-11	150.00	Munch	Munch	Bs.Till(U.)Rad.(Tr.E.)alt.(chloritic).
83-12	80.00	Munch	Munch	R.Low.VLF.Rad.(Tr.E.)Nearby Soils(U.)& alt.(chloritic)
83-13	68.00	Gnaw	Bikini	Showing ext.Soils(U.)Geol.contact inferred from R/data
83-14	54.53	Gnaw	Bikini	Showing ext.Soils(U.)Geol.contact inferred from R/data
83-15	85.15	Gnaw	Bikini	Showing ext.Soils(U.)Geol.contact inferred from R/data
83-16	50.00	Gnaw	Bikini	Rad. drilled to find source.
83-17	44.00	Gnaw	Gnaw	Rad.(Scint.)Soils(U.).
83-18	45.00	Gnaw	Gnaw	VLF.R/Low.Soils(U.).
83-19	99.00	Gnaw	Bikini	VLF.Rad.(Tr.E.)Soils(U.).
83-20	108.00	Gnaw	Bikini	VLF.Soils(U.) 400 m. N.E. of Bikini Showing.
83-21	35.00	Gnaw	Bikini	Showing ext. Soils (U.) nearby.
83-22	70.00	Gnaw	Bikini	Showing ext. Soils (U.) nearby. Suspected NNE. fr.z.
83-23	60.23	Gnaw	Bikini	VLF. Soils (U.).
83-24	84.78	FC	FC	R./Low. VLF.
83-25	80.00	FC	FC	EM(MM.).
83-26	70.00	FC	FC	Soils U.
83-27	50.00	FC	FC	Rad.(Scint.)Radioactive joints.Rad (Tr.E.).
83-28	45.00	FC	FC	Rad.(Scint.)Adj. Rad.(Tr.E.)and R./Low.
83-29	60.00	FC	FC	Rad.(Scint.).
83-30	102.56	FC	FC	Rad. (Tr.E.) Lk. Seds. (U.).
83-31	50.00	FC	FC	Rad. (Tr.E.) LK. Seds. (U.).
83-32	60.00	FC	FC	Rad. (Tr.E.,Alph.).
83-33	63.95	Tabb	Tabb B	Rad.(Scint.).
83-34	75.50	Tabb	Tabb B	Rad.B.Tr.
83-35	40.00	Tabb	Tabb B	Ext.of radioactive sh.z cut in hole 83-34.
83-36	126.00	Tabb	Tabb B	Radioactive joints near graphitic shear.
83-37	73.00	Tabb	Tabb A	Showing ext.
83-40	107.00	Tabb	Tabb	Rad(Tr.E.) Inferred fault convergence.
83-41	126.00	Tabb	Tabb	VLF. Rad. (Tr.E.). Regolith.
83-38	32.00	Cobalt	Cobalt	Showing ext.
83-39	60.00	Cobalt	Cobalt	Showing ext. VLF.
83-42	63.50	Tabb	Tabb B	Rad.Graph.sh.with VLF conductor and Surface Rad(Scint)
83-43	63.50	Tabb	Will	Rad.(scint.) Graph. sh. Br.z.
83-44	89.00	Bear	Flare 2	Showing ext. Br.z. extension.
83-45	112.00	Bear	Flare 2	Rad(Scint)coincident with westerly trending structure.
83-46	98.70	Bear	Flare 2	Br.z. South of Flare 2 Br.z. showing.

RESULTS OF DOWN HOLE RADIOMETRIC PROBES

One or more anomalous spot highs were recorded in 24 out of 46 holes. Nine spot highs in 7 holes (3 holes on the Tabb Grid, 2 at the Flare 2 showing, One on the Munch Grid and one on the Gnaw Grid) gave radiometric counts equivalent to concentrations of 0.05% - 0.25% U_3O_8.

Geology, Main bedrock types intersected

Hbss. H.(gr.) Ak.(amph.sch.). 6.5 m. br. z. and fault gouge.
H.(gr.gn.)Ak.(amph.) Mainly qtz.feld.-bio. gneiss 0.3 m. graph.py.z.
H.(gr.gn.) Ak. Mainly qtz.feld.-bio. gneiss.
H.(gr.gn.) Ak. (Locally graphitic) 4.2 m. graph. py.z.
Hbss. Hbcg. (minor). Local alt.(chloritic) in Hbss. 25.3 m. fr.z. with hem.
Hbss. Hbcg. (minor). Local alt.(chloritic) in Hbss. Hbss. locally br.
Hbss.
H. (gr.gn.) Ak. (bio.sch. and carbonate) 0.3 m. graph. py.z.
Hbss. Hbcg. (minor). Local brecciation.
Hbss. Local alt. (chloritic and clay). Br.z. at contact with Ak.
Hbss. Hbcg. Ak. (volcanics) Alt. (Hbss.) local hematite and bleaching.
Hbss. Hbcg. Ak. (volcanics and argillite).
Ak. (arg. qtz.-bio.chlor.sch.).
Ak. (arg. qtz.-bio.chlor.sch.) Sch. locally pyritic.
Ak. arg.locally br. qtz.-bio.chlor.sch.locally br.) Minor calc.-silicate.
Ak. (qtz.-bio.-sch.) 2.5 m. br.z.
Ak. (qtz.-bio.-chlor.sch.).Minor calc.-silicate and dol. 2 - 1 m. br.sch.
Ak. (arg. chlor.-bio.-amph.schist) Three br. zones.
Hbss. Hbcg.Ak.(musc.-chlor.sch.) at end of hole.
Hbss. Hbcg. Ak. (bio.-chlor.sch. calcareous bio-sch.).
Ak. (Sch:bio.-chlor. bio. bio.-qtz.-chlor.)
Ak. (arg;sch:bio.-chlor. qzt.-bio. bio.).
Ak. (bio.-qtz.sch.) Alt.(hem).
Hbss.Minor Hb. mudstone and Hbcg.
Hbss. (minor conglomeratic Hbss.).
Hbss. Hbss.(regolith) Ak.(brecciated felsic-metavolcanics).
Hb? (May be paleotalus of Ak. boulders and frags.) Ak. sch.
Hb (paleotalus).
Hb(minor paleotalus) Ak. (intermed. volc. and sch.).
Hbss. Alt. (hem. bleaching and clay).
Diabase Ak.(intermed. and mafic metavolcanics).
Ak. (felsic metavolcanic).
H.(gr.gn.) Ak. (marble)Serp. 13 m. wide Sh.z. locally graphitic.
H. (gr. including diorite gn.). 0.6 m graph. Sh.z.
H. (gr.gn.) Br. with graph. and graphitic sh. zones.
H. (gr.gn.) minor diabase dykes. Graph.sh.zones and schist.
H. Sh.z.
Hbss. Hbcg. Ak(?) H.(gr.gn.) Hole cuts Bear Shear.
Hbss. Hbcg. H.(gr.) and schist.
H(gr.).
H(gr.).
H.(gr. including diorite) Serp. on Bear Shear.
Graphitic chlorite schist, locally with py. H.(gr. and gr.gn.)
Hbss. Minor Hbcg. and paleotalus. Diabase at end of hole.
Hbss. br. Hbcg. Br.z. has chloritic alt. Hb. paleotalus.
Hbss. with br. zones.

EM CONDUCTORS

In 12 holes, conductors delineated by previous surface surveys were traced to graphite mostly associated with shear or fracture zones. Seven conductors were explained by fractures, brecciation or zones of shearing encountered by drilling.

Geological Legend

Key to Formation

Hbss. Hornby Bay Group sediments (mostly sandstone).
Hbcg. Hornby Bay Group Conglomerate.
H. Hepburn Batholith rocks.
Ak. Akaitcho Group.

Abbreviations

Geophysical Anomaly Type

VLF.-EM...VLF.-	electro-magnetic
EM.(MM.)	Max.-Min. - II EM. System
R./Low.	Resistivity low from EM.16 R.
R./	Resistivity

Radiometric Anomaly Type

Rad.(scint.)	Scintillometer
Rad.(Tr.E.)	Track Etch
Rad.(PT)	Powell radon tube
Rad.(Alph.)	Alphameter

Geochemical Anomaly Type

Soils (U),(Po^{210}) Anomaly delineated by soil sampling survey. Anomalously concentrated element bracketted.

Lk. Seds (U) Anomalous concentration of uranium in lake sediments.

Geological

alt.	Alteration
amph.	Amphibolite
arg.	Argillite
bio.	Biotite
br.	Breccia, brecciated
br.z.	Breccia zone
chlor.	Chlorite, chloritic
dol.	Dolomite
ext.	Extension
feld.	Feldspar
frag.	Fragment
fr.z.	Fracture zone
geol.	Geological
gn.	Gneiss
gr.	Granitic
graph.	Graphite
hem.	Hematite
intermed.	Intermediate
musc.	Muscovite
py.	Pyrite
qtz.	Quartz
sch.	Schist
sh.z.	Shear Zone
volc.	Volcanic
serp.	Serpentinite

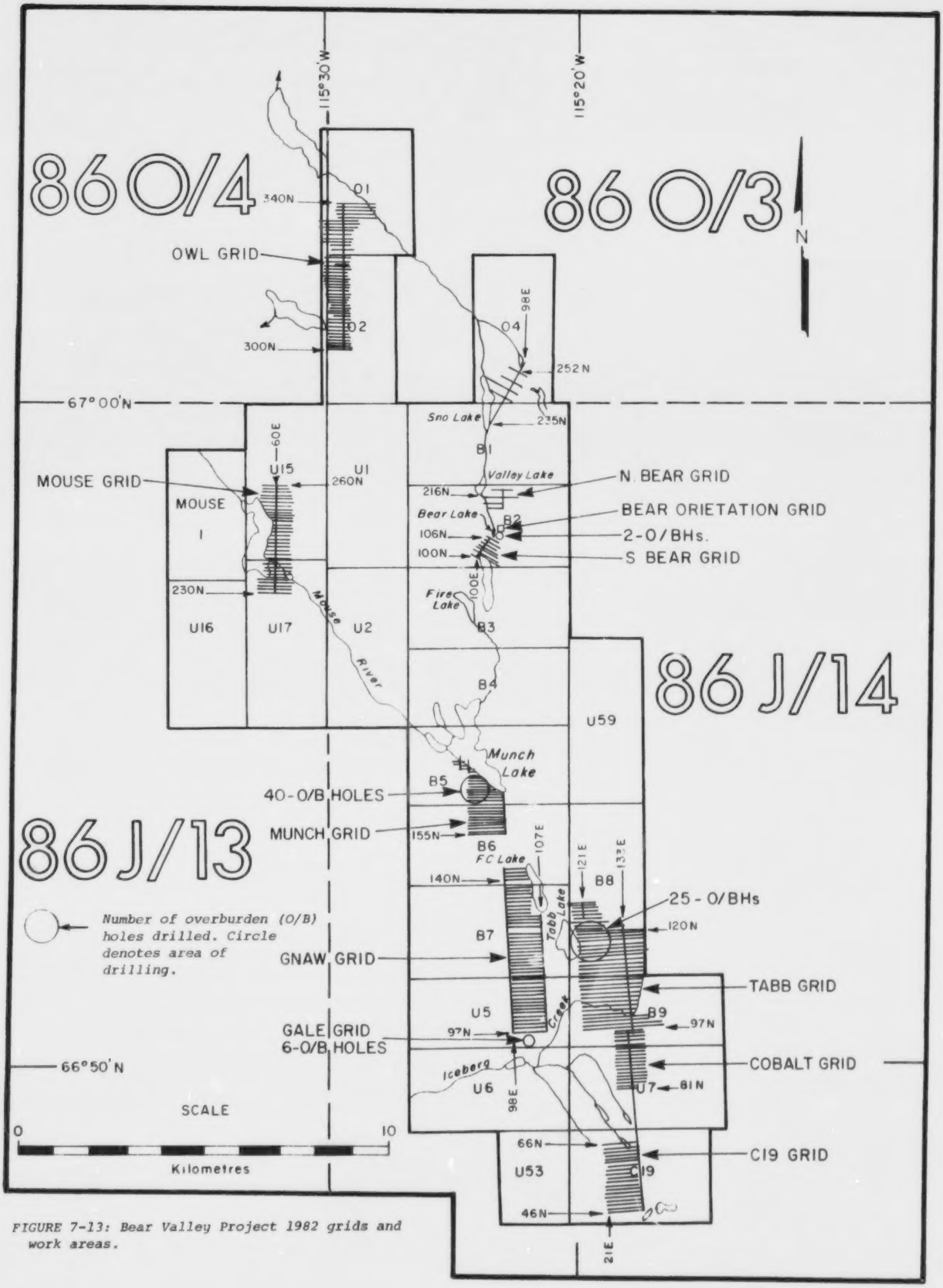

86O/4
86O/3
86J/14
86J/13
115°30'W
115°20'W
67°00'N
66°50'N
N
340N
300N
O1
O2
O4
OWL GRID
98E
252N
235N
Sno Lake
B1
Valley Lake
N. BEAR GRID
216N
Bear Lake
B2
BEAR ORIETATION GRID
106N
2-O/BHs.
100N
S BEAR GRID
100E
Fire Lake
B3
B4
MOUSE GRID
60E
U15
260N
U1
MOUSE I
230N
U16
U17
U2
Mouse River
U59
Munch Lake
B5
40-O/B HOLES
MUNCH GRID
155N
B6
FC Lake
107E
121E
133E
140N
B8
Tabb Lake
25-O/BHs
120N
B7
GNAW GRID
TABB GRID
U5
Creek
B9
97N
GALE GRID
6-O/B HOLES
97N
COBALT GRID
Iceberg
U6
98E
U7
81N
SCALE
0
10
Kilometres
66N
C19 GRID
U53
C19
46N
21E
Number of overburden (O/B) holes drilled. Circle denotes area of drilling.

FIGURE 7-13: Bear Valley Project 1982 grids and work areas.

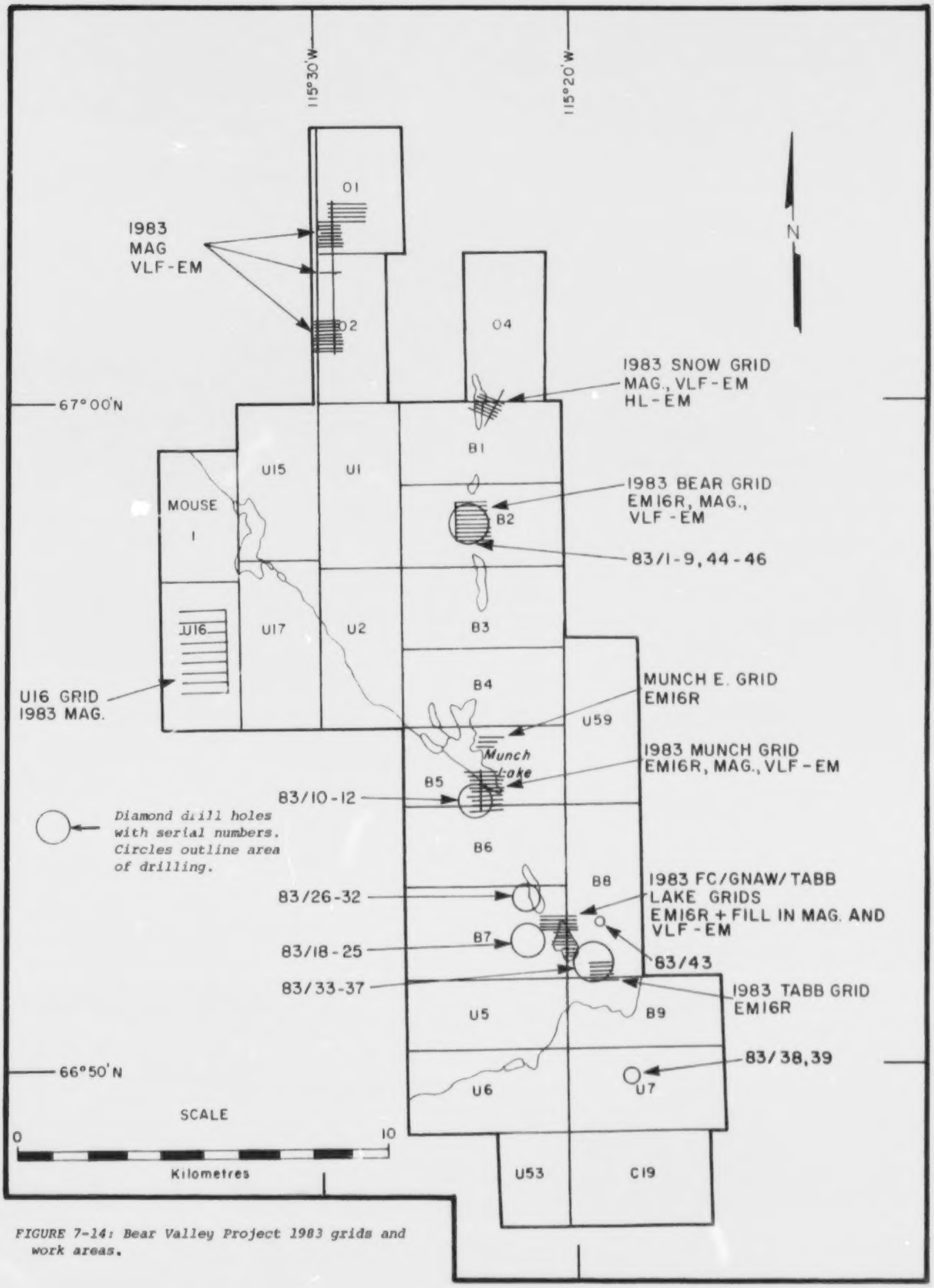

115°30'W
115°20'W
O1
O2
O4
1983
MAG
VLF-EM
1983 SNOW GRID
MAG., VLF-EM
HL-EM
67°00'N
B1
U15
U1
MOUSE
I
1983 BEAR GRID
EM16R, MAG.,
VLF-EM
B2
83/1-9, 44-46
U16
U17
U2
B3
B4
U16 GRID
1983 MAG.
MUNCH E. GRID
EM16R
U59
1983 MUNCH GRID
EM16R, MAG., VLF-EM
Munch
Lake
B5
83/10-12
Diamond drill holes
with serial numbers.
Circles outline area
of drilling.
B6
B8
1983 FC/GNAW/TABB
LAKE GRIDS
EM16R + FILL IN MAG. AND
VLF-EM
83/26-32
B7
83/18-25
83/43
83/33-37
1983 TABB GRID
EM16R
U5
B9
83/38,39
66°50'N
U6
U7
SCALE
0
10
Kilometres
U53
C19
N

FIGURE 7-14: Bear Valley Project 1983 grids and work areas.

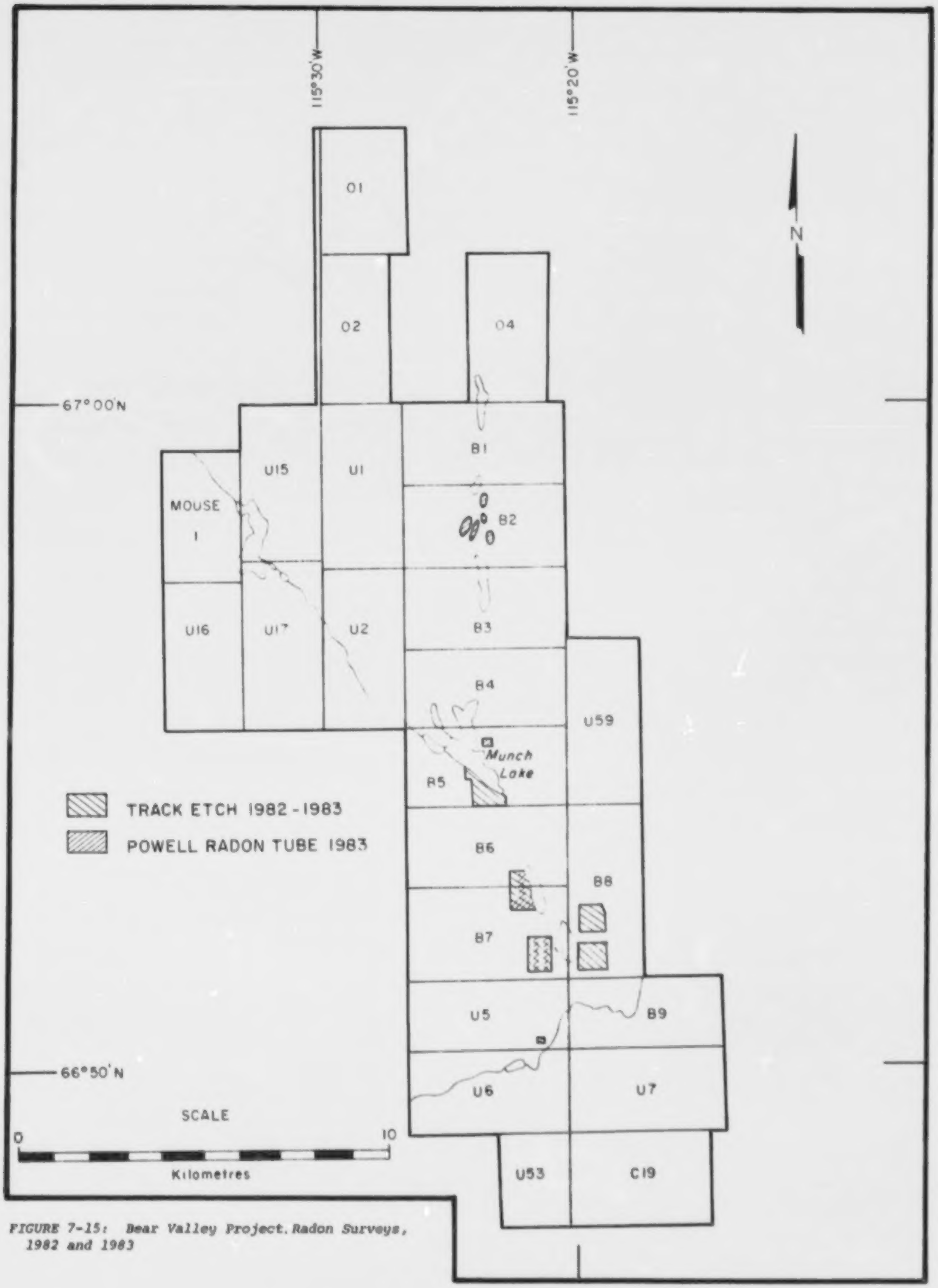

115°30'W
115°20'W
N
01
02
04
67°00'N
B1
U15
U1
MOUSE
1
B2
U16
U17
U2
B3
B4
U59
Munch
Lake
B5
▧ TRACK ETCH 1982-1983
▨ POWELL RADON TUBE 1983
B6
B8
B7
U5
B9
66°50'N
U6
U7
SCALE
0
10
Kilometres
U53
C19

FIGURE 7-15: Bear Valley Project. Radon Surveys, 1982 and 1983

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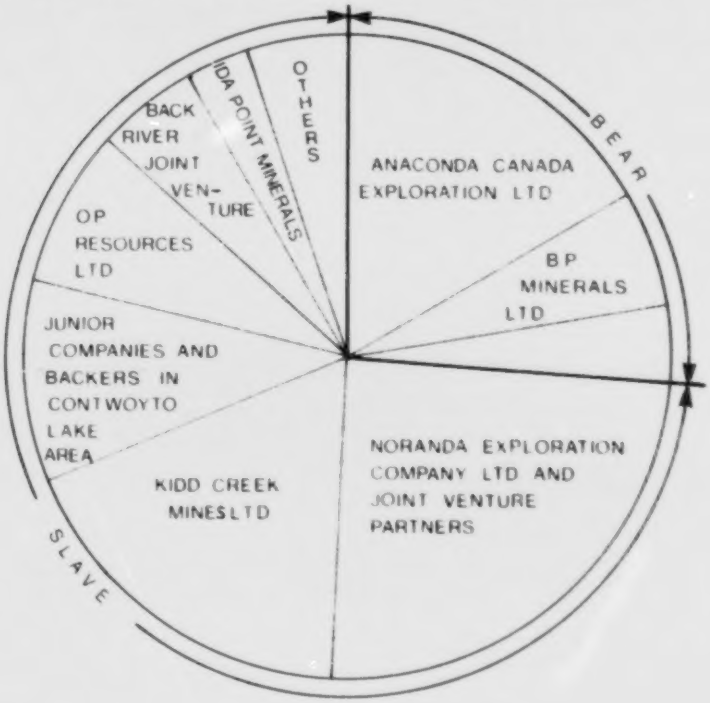
APPENDIX

COMPARISON OF EXPLORATION EXPENDITURES AND THEIR DISTRIBUTION BY COMPANY AND LOCALITY FOR BEAR AND SLAVE STRUCTURAL PROVINCES.



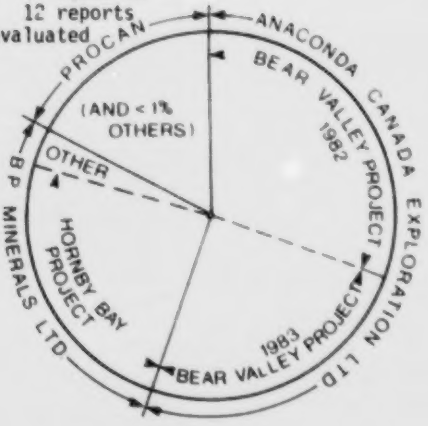
NOTE

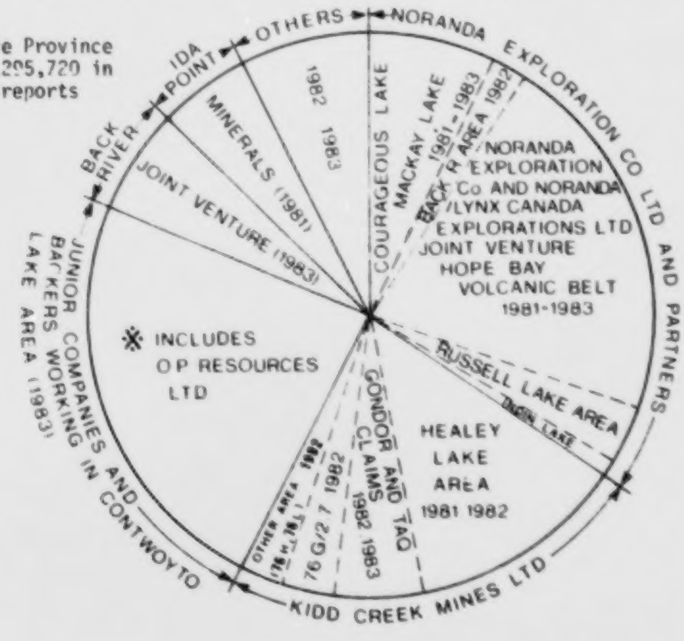
Comparisons are a gross approximation only, because -

1. They are based on assessment work evaluated which includes mainly 1982 and 1983 work, but some 1981 work, together used in compiling the 1982-1983 Mineral Industry Report
2. Work on mining leases eg. at Lupin Mine, Contwoyto Lake is excluded as are some regional surveys
3. Much diamond drilling and some trenching expenditure has been omitted from calculations

Slave Province
$2,295,720 in
41 reports

Bear Province
$747,366 in
12 reports
evaluated





CHAPTER 8: SLAVE STRUCTURAL PROVINCE

by J.B. Seaton, District Geologist, Bear and Slave
Structural Provinces, and J.C. Crux, Research
Assistant, Northern Affairs Program, Yellowknife, NWT

INTRODUCTION

This introductory section to the Slave Structural Province is essentially the same as that in the 1977, 1978, 1979 and 1980-81 Mineral Industry Reports, but has some modifications in the list of subdivisions under which properties are discussed.

About two-thirds of the Slave Structural Province is made up of sediments and volcanics of the Archean Yellowknife Supergroup that have been metamorphosed under greenschist to upper amphibolite grade conditions (Frith, 1978; Neilsen, 1978; Percival, 1979; Thompson, 1978). The supracrustal rocks, of which about 15% are volcanics, are exposed in sinuous and anastomosing belts locally wrapped around basement gneisses, and commonly flanked, separated or interrupted by quartz-diorite, quartz-monzonite and granite intrusions. Relatively narrow volcanic belts containing various proportions of mafic, intermediate and felsic components are commonly flanked on one, rarely on both, sides by metasediments. The metasediments are predominantly greywacke, commonly interbedded with thinner pelitic layers with phyllitic or slaty cleavage. Topographically recessive phyllite may overlie the volcanics or may be found locally within the volcanic sequence.

Contact relations of granitoid plutons with surrounding supracrustal rocks are generally concordant (Henderson, 1976), although crosscutting granodiorites, quartz monzonites and associated pegmatites have been mapped. Locally the plutons are bordered by migmatite. Contact metamorphic aureoles may be extensive or practically absent.

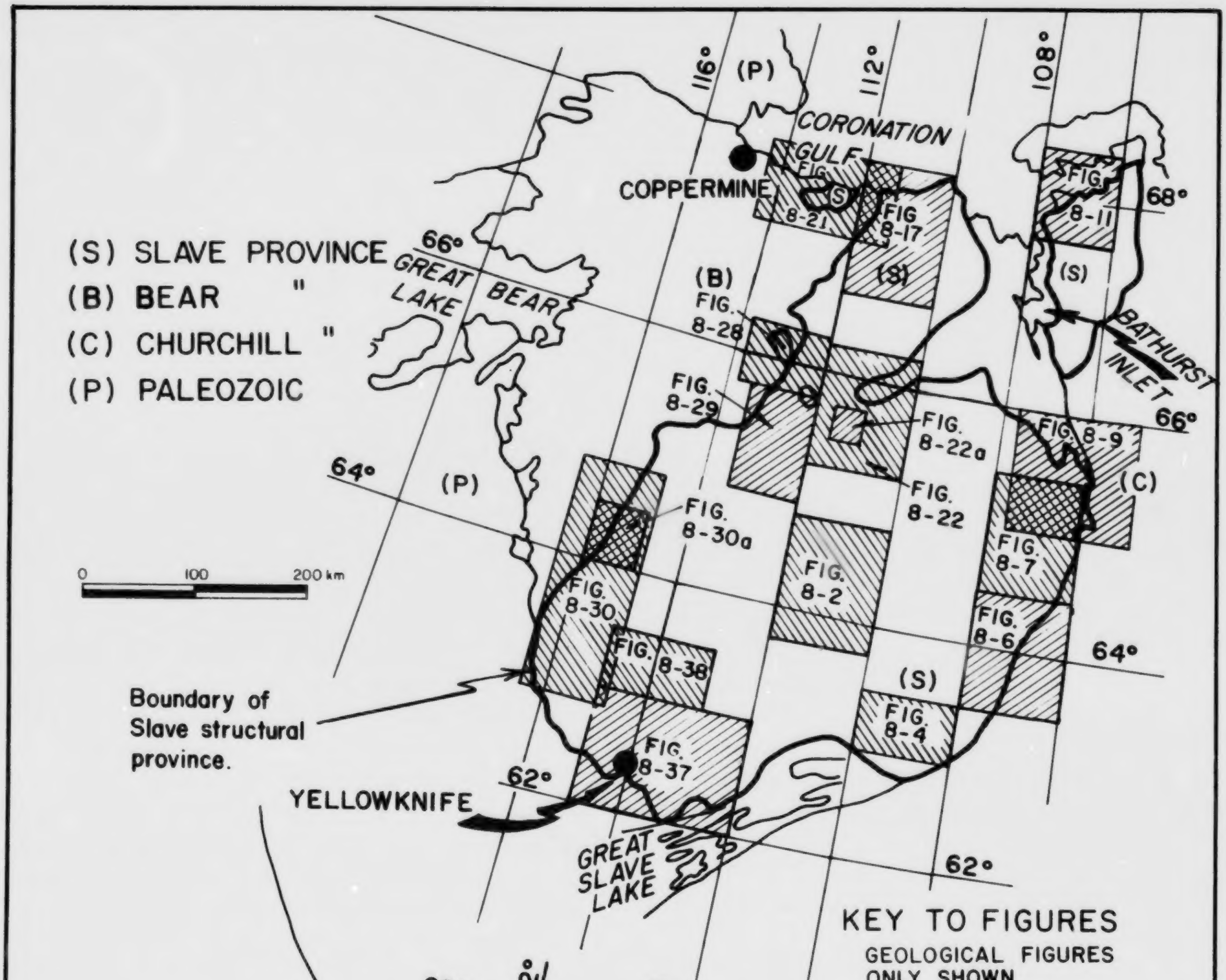
Economic mineral discoveries have been mainly in the volcanics, and consequently these rocks have been more intensely studied. Most of the volcanic belts have been covered - in many cases more than once - by airborne magnetometer and EM surveys which have outlined numerous conductors mostly related to graphitic volcanogenic sediments or extensive zones of disseminated sulphides.

The extent of pre-Yellowknife Supergroup basement is still speculative and will remain so until more geochronological studies and detailed mapping have been done. Locally, plutonic gneisses and massive rocks of tonalitic composition unconformably underlie supracrustal rocks of the Yellowknife Supergroup, as at Point Lake (Baragar and McGlynn, 1976; Henderson, 1977; Henderson and Easton, 1977). Commonly the basal contact of the Yellowknife Supergroup has been obliterated by granitic intrusions. Broad zones of granitic gneiss, migmatite and mixed gneisses, including or derived from Yellowknife Supergroup rocks (unit An of McGlynn, 1977), may include basement that is so far unrecognized. Some tonalitic clasts in the Yellowknife Supergroup sediments may be derived from unroofed syntectonic plutons.

Volcanic belts may comprise more than one cycle of volcanism, as do the Back River Volcanic Complex and the Courageous Lake-MacKay Lake Volcanic Belt. Distally, the volcanics, in most cases, interfinger with the sediments that fill the greater part of the basins. Iron formations within the sediments may be distal products of volcanism. The sediments clearly show complex folding, whereas in the more competent volcanics the effect of such folding is obscure.

Underground development and exploration at the Lupin gold property (76 E/14) is described in Chapter 2, Operating Mines.

Selected references relating to specific parts of the Slave Province or to individual properties are listed in the appropriate sub-sections. Some general references on the Slave Province and some which, by their nature, do not lend themselves to inclusion in property sub-sections (for example, regional, structural, geochemical or airborne radiometric surveys by the Geological Survey of Canada) include: Allan and Cameron (1973); Allan, Cameron and Durham (1973a,b,c); Dillon-Leitch (1979); Baragar and McGlynn (1976); Cameron (1980); Darnley (1973); Darnley and Grasty (1972); Frith (1980a,b, 1981a, b); Frith and Roscoe (1980); Fyson (1980, 1981, 1982); Fyson and Frith (1979); Henderson (1972, 1975a,b, 1976, 1978, 1981); Henderson and Thompson (1980); Heywood and Davidson (1969); King (1982); Lambert (1977, 1978); Lambert and Henderson (1980); Lord (1941, 1942); McGlynn (1977); McGlynn and


116°
(P)
112°
108°
CORONATION GULF
COPPERMINE
FIG. 8-21
(S)
FIG. 8-17
FIG. 8-11
68°
(S) SLAVE PROVINCE
(B) BEAR "
(C) CHURCHILL "
(P) PALEOZOIC
66°
GREAT BEAR LAKE
(B)
FIG. 8-28
(S)
(S)
BATHURST INLET
FIG. 8-29
FIG. 8-22a
66°
FIG. 8-9
64°
(P)
FIG. 8-22
(C)
FIG. 8-30a
FIG. 8-2
FIG. 8-7
0
100
200 km
FIG. 8-30
FIG. 8-6
FIG. 8-38
64°
(S)
Boundary of Slave structural province.
FIG. 8-4
FIG. 8-37
62°
YELLOWKNIFE
GREAT SLAVE LAKE
62°
N.T.S. SHEETS COVERING SLAVE STRUCTURAL PROVINCE
68°N
112°
77
B
A
P
M
N
O
P
86
I
L
K
J
0
150
300 km
76
G
H
E
F
G
B
3
14
15
16
2
5
A
9
4
3
2
1
8
D
C
B
N
O
P
M
N
64°
104°W
J
I
L
O
85
K
YELLOWKNIFE
75
112°

KEY TO FIGURES

GEOLOGICAL FIGURES ONLY SHOWN.

FIG. NO.	AREA
8-2	Courageous Lake
8-4	Walmsley Lake
8-6	Healey Lake
8-7	Regan Lake
8-9	Beechey Lake and Ellice River
8-11	Hope Bay
8-17	High Lake, Anialik River
8-21	Eokuk Lake
8-22	Contwoyto Lake
8-28	Takijuq Lake and Hood River
8-29	Point Lake
8-30	Russell Lake and Indin Lake
8-37	Yellowknife and Hearne Lake
8-38	Giauque Lake and Gordon Lake

FIGURE 8-1: Location key to geological figures and NTS sheets covering the Slave Province

Henderson (1970, 1972); Richardson and others (1973, 1974); Ross (1966); Stockwell (1933); and Thompson (1978).

In the following sections, properties have been grouped under 13 headings, indicative of common geological - in a few cases, geographical - settings. These headings are:

- Courageous Lake-Mackay Lake Volcanic Belt;
- Walmsley Lake Supracrustal Belt;
- Healey Lake-Regan Lake Supracrustal Belts and Southern Hackett River Volcanic Belt;
- Beechey Lake Basin;
- Ellice River Area;
- Hope Bay Volcanic Belt;
- High Lake and Anialik River Supracrustal Belt;
- Eokuk Inlier;
- Central ("Olga Lake") Volcanic Belt, and Lupin Mine Area;
- Hood River-Takijuq Lake Supracrustal Belt;
- Point Lake Supracrustal Belt;
- Russell Lake-Indin Lake Supracrustal Belt;
- Yellowknife Supracrustal Basin;

The distinction between volcanic belts and supracrustal belts is arbitrary, in that most volcanic belts include variable amounts of metasediments. Moreover, volcanic belts are separated from one another by granitoid intrusions, by basement or possible basement to the Yellowknife Supergroup, and by metasediments. Hence volcano-sedimentary belts (supracrustal belts) are themselves joined by sediments making precise delineation of individual supracrustal belts rarely possible. The term "supracrustal belt" is used in this report to describe a volcanic belt containing numerous sedimentary units that by volume are an important component of the belt. For convenience some properties underlain by granitoid rocks and marginal to a volcanic or supracrustal belt are included under the appropriate belt title.

Most figures in the 1982-1983 Mineral Industry Report are from McGlynn's (1977) 1:1,000,000 geological compilation of the Bear and Slave Structural Provinces (Fig. 8-1). Though this is adequate and convenient to show the gross geological settings of properties, it requires updating, and should be used in conjunction with references to more recent and detailed work given with each property report.

Table 8-1 lists and records the general nature of work on claims and leases where, for various reasons, work could not be reported in more detail.

An appendix to Chapter 7 on page 286 gives a rough indication of relative expenditures by companies on various projects in various areas and provides a comparison with expenditures in the Bear Structural Province.

COURAGEOUS LAKE-MACKAY LAKE VOLCANIC BELT

This belt (Fig. 8-2) is roughly 60 km long and 5 km wide and trends northwesterly from the vicinity of Nodinka Narrows, on MacKay Lake, to near the north end of Courageous Lake.

Additional work done in this area is listed in Table 8-1.

BERTHA, FAT CLAIMS

Noranda Exploration Co. Ltd.	Gold, Base metals
4 - 2130 Notre Dame Ave.	76 D/3
Winnipeg, Man., R3H 0K1	$64^{o}06'35"-64^{o}07'50"$N
	$111^{o}15'35"-111^{o}16'55"$W

REFERENCES

Folinsbee (1949); Henderson (1944); Moore (1956); Padgham and others (1976); Seaton (1983a); Thorpe (1966).

DIAND assessment report 081689.

PROPERTY

BERTHA 1; FAT 10, 15, 16, 62.

LOCATION

The BERTHA 1 claim (Figs 8-2, 8-3) is 240 km northeasterly of Yellowknife. The claim covers part of the shoreline of the eastern arm of Courageous Lake, but lies mainly south of the lake. The southern boundary of BERTHA 1 is about 1 km north of the northern end of Matthews Lake. The FAT claims adjoin the BERTHA 1 claim; those four reported on here are but a few of a much larger group.

HISTORY

Gold was discovered in the Salmita area on the eastern side of Matthews Lake in 1939. The area now occupied by BERTHA 1 was staked in 1946 as the NASH, KB and TPR claims. It was probably staked a few years earlier under various claim names though information is incomplete.

The first recorded exploration of the property

TABLE 8-1: PROJECTS REPORTED AS DIAMOND DRILL SUMMARIES ONLY, OR REPORTED TOO LATE FOR DETAILED REVIEW IN THIS MINERAL INDUSTRY REPORT

PROPERTY OR CLAIMS	OPERATOR	AREA	LOCATION DETAILS - NTS	LAT., LONG.	YEAR OF WORK	TYPE OF WORK/TARGET COMMODITY
Salmita Mine	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	Near eastern shore of Matthews Lake - 76 D/3.	64°04.5'N 111°14.5'W	1982	Extension of decline, drifting, geological mapping, sampling and feasibility study/Au.
Salmita Mine	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	Near eastern shore of Matthews Lake - 76 D/3.	64°04.5'N 111°14.5'W	1983	Preparation for production/Au.
SALERNO 14	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	At Salmita Mine - 76 D/3.	64°04.5'N	1983	Diamond drilling/Au.
RED 24	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	Near northern end of Matthews Lake - 76 D/3.	64°06'N 111°16'W	1983	Diamond drilling/Au.
MAD 13	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	Southern end of Matthews Lake - 76 D/3.	64°02'N 111°12'W	1983	Diamond drilling/Au.
BS 1	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	3 km south-southeasterly of southern end of Matthews Lake - 76 D/3.	64°01'N 111°10'W	1983	Diamond drilling/Au.
ARES claims	Noranda Exploration Company Ltd.	High Lake and Anialik River Supracrustal Belt.	Midway between Hood and James Rivers - 76 M/2.	67°02'N 110°51'W	1982	Diamond drilling/Ag, base metals.
CANOE claims	Noranda Exploration Company Ltd.	High Lake and Anialik River Supracrustal Belt.	Northwest of ARES claims - 76 M/3.	67°07.5'N 111°06'W	1982	Diamond drilling/Ag, base metals.
ICE DELTA claims	Noranda Exploration Company Ltd.	High Lake and Anialik River Supracrustal Belt.	At the Hood River - 76 L/15.	66°49.5'N 110°51'W	1982	Diamond drilling/Ag, base metals.
SAXIFRAGE	Noranda Exploration Company Ltd.	High Lake and Anialik River Supracrustal Belt.	5 km south of the Hood River - 76 L/15.	66°47'N 110°54'W	1982	Diamond drilling/Ag, base metals.
Arcadia Property	Canuc Resources Ltd.	High Lake and Anialik River Supracrustal Belt.	North Vein - 76 M/11.	64°42'N 111°22'W	1983	Diamond drilling/Ag, base metals.
SIDD 1-10	Noranda Exploration Company Ltd.	Healey Lake-Regan Lake Supracrustal Belt.	76 G/4	65°09'N 107°49'W	1983	Diamond drilling/Au.
MATE claims	Silver Hart Mines Ltd.	Healey Lake-Regan Lake Supracrustal Belt.	Near Back River - 76 B/13.	64°54'N 107°41'W	1983	Diamond drilling and other exploration/Au.
HOOD claims	Kidd Creek Mines Ltd.	Hood River-Takijuq Lake Supracrustal Belt.	No. 10, 41 and 41 A massive sulphide deposits near Amoogabooga Lake - 86 I/2.	66°05'N 112°45'W	1982	Diamond drilling/Ag, base metals.
REN claims	Kidd Creek Mines Ltd.	Point Lake Supracrustal Belt.	Near Itchen River, between Itchen and Point Lakes - 86 H 6,7.	65°23'N 112°58'W	1982	Diamond drilling/Au.
CUB 1	Echo Bay Mines Ltd.	Point Lake Supracrustal Belt.	North of Itchen Lake - 86 H/10.	65°34'N 112°52'W	1983	Magnetometer surveys, prospecting/Au.
SIK claims	Echo Bay Mines Ltd.	Point Lake Supracrustal Belt.	North of Itchen Lake - 86 H/9.	65°40.5'N 112°24'W	1983	Magnetometer surveys, prospecting/Au.
SKI claims	Echo Bay Mines Ltd.	Point Lake Supracrustal Belt.	North of Itchen Lake - 86 H/10.	65°43'N 112°33'W	1983	Magnetometer surveys, prospecting/Au.
DER claims and Lupin Mine area	Echo Bay Mines Ltd.	Central (Olga Lake) Volcanic Belt and Lupin Mine area.	West of Fingers Lake and 6 km south of Lupin Mine - 76 E/11	65°43'N 111°13'W	1982,3 1983	Underground diamond drilling at Lupin Mine/Au. Diamond drilling/Au.
GONDOR claims	Kidd Creek Mines Ltd.	Central (Olga Lake) Volcanic Belt and Lupin Mine area.	North of Olga Lake in Central Volcanic Belt - 76 E/12.	65°34'N 111°48'W	1983	Diamond drilling of Gondor massive sulphide deposit/Ag.
MAHE	Giant Bay Resources Ltd.	Yellowknife Supracrustal Basin.	North of Knights Bay, Gordon Lake - 85 I/14.	62°57.5'N 113°20'W	1983	Diamond drilling/Au.
VEN	Newcan Minerals Ltd.	Yellowknife Supracrustal Basin.	North of Gordon Lake - 85 P/6.	63°17.5'N 113°03'W	1983	Diamond drilling/Au.
JANE	Newcan Minerals Ltd.	Yellowknife Supracrustal Basin.	Adjoins and lies south of VEN claims - 85 P/6.	63°16'N 113°03'W	1983	Prospecting/Au.
TA	Terra Mines Ltd.	Yellowknife Supracrustal Basin.	At Bullmoose Lake - 85 I/7.	62°20'N 112°44.3'W	1983	Underground development, surface and underground diamond drilling/Au.
Thompson-Lundmark Mine Lease area.	Ardic Exploration and Development Ltd.	Yellowknife Supracrustal Basin.	At Thompson Lake - 85 I/11,12.	62°37'N 113°29'W	1983	VLF-EM, magnetics, IP, sampling of veins/Au.
GOO claims (including leased claims)	Burnt Island Gold Ltd.	Yellowknife Supracrustal Basin.	Burnt Island, Gordon Lake and nearby - 85 P/3.	63°04'N 113°09'W	1982	Diamond drilling (21 holes, 19 on Burnt Island)/Au.
JIM	Kengate Resources Ltd.	Yellowknife Supracrustal Basin.	Gordon Lake - 85 I/14.	62°59'N 113°07'W	1982	Diamond drilling/Au.
MQ-001	Black Ridge Gold Ltd.	Yellowknife Supracrustal Basin.	South shore of Gordon Lake - 85 I/14.	62°55.5'N 113°13.5'W	1982	Diamond drilling/Au.
REG, RGE 2	Eldon Resources Ltd.	Yellowknife Supracrustal Basin.	Near the Cameron River - 85 I/14.	62°48'N 113°12'W	1983	Geology, geophysics, sampling/Au.
NEGUS, PRW, PRWX, CAGEX fraction	Cominco Ltd.	Yellowknife Supracrustal Basin.	At Negus Point - 85 J/8.	62°26'N 114°21'W	1983	Diamond drilling from ice of Yellowknife Bay/Au.
RUSS 1	Noranda Exploration Company Ltd.	Indin Lake and Russell Lake Supracrustal Belt.	Near Discovery Mine - 85 J/13, O/4.	63°00'N 115°57'W	1982	Prospecting, geological mapping/Au.
WIJ, INN, EDI	Noranda Exploration Company Ltd.	Indin Lake and Russell Lake Supracrustal Belt.	Near Wijinnedi Lake - 85 O/14.	63°57'N 115°11'W	1982	Prospecting, geological mapping/Au.
DON 3,4	Host Ventures Ltd. (now Hot Resources Ltd.)	Indin Lake and Russell Lake Supracrustal Belt.	Near Slemon Lake - 85 N/8.	63°16.5'N 116°06.5'W	1983	Diamond drilling/Au.
DAN 9	Treasure Island Resources Ltd.	Indin Lake and Russell Lake Supracrustal Belt.	Spider Lake - 86 B/6	64°29.5'N 115°08'W	1983	Diamond drilling/Au.
NERAK and other claims	Westsun Petroleum and Minerals Ltd.	Eokuk Inlier	On and near coast of Coronation Gulf - 86 P/9,10.	67°40'N 112°31'W	1983	Geological mapping, prospecting, sampling a vein/Ag.

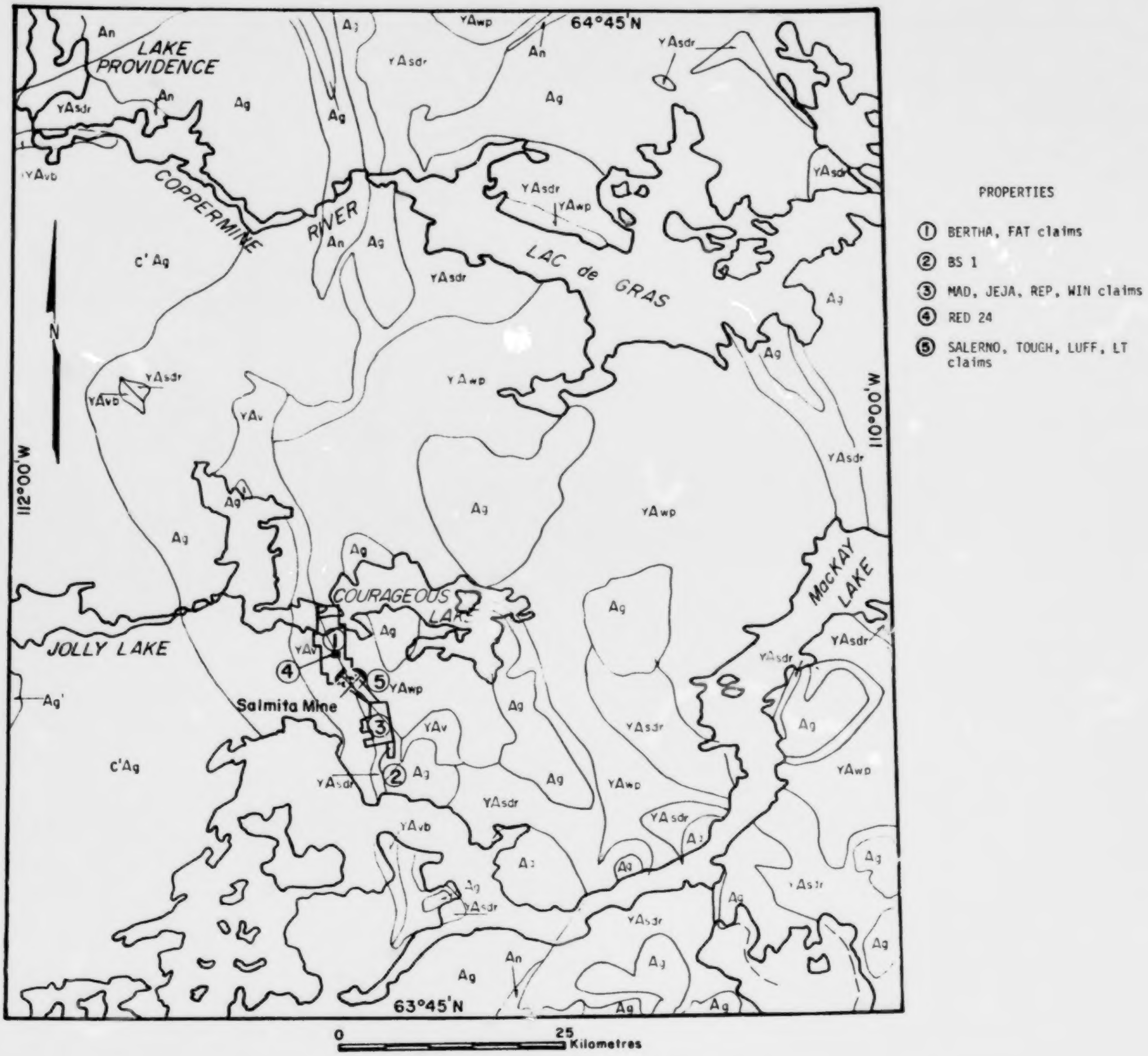

64°45'N
63°45'N
112°00'W
110°00'W
N
LAKE PROVIDENCE
COPPERMINE RIVER
LAC de GRAS
COURAGEOUS LAKE
JOLLY LAKE
MacKAY LAKE
Salmita Mine
An
Ag
Ag'
C'Ag
YAsdr
YAwp
YAvb
YAv
① ② ③ ④ ⑤
0
25
Kilometres
PROPERTIES
① BERTHA, FAT claims
② BS 1
③ MAD, JEJA, REP, WIN claims
④ RED 24
⑤ SALERNO, TOUGH, LUFF, LT claims

FIGURE 8-2: Regional geology and properties in the Courageous Lake-MacKay Lake Volcanic Belt. Geology from McGlynn (1977).

ARCHEAN

C'An C'Ag	Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup
Ag'	Late or post tectonic granodiorites and quartz monzonites
Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks

YELLOWKNIFE SUPERGROUP

YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAwp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
YAvb	Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks
YAv	Volcanic rocks, undivided

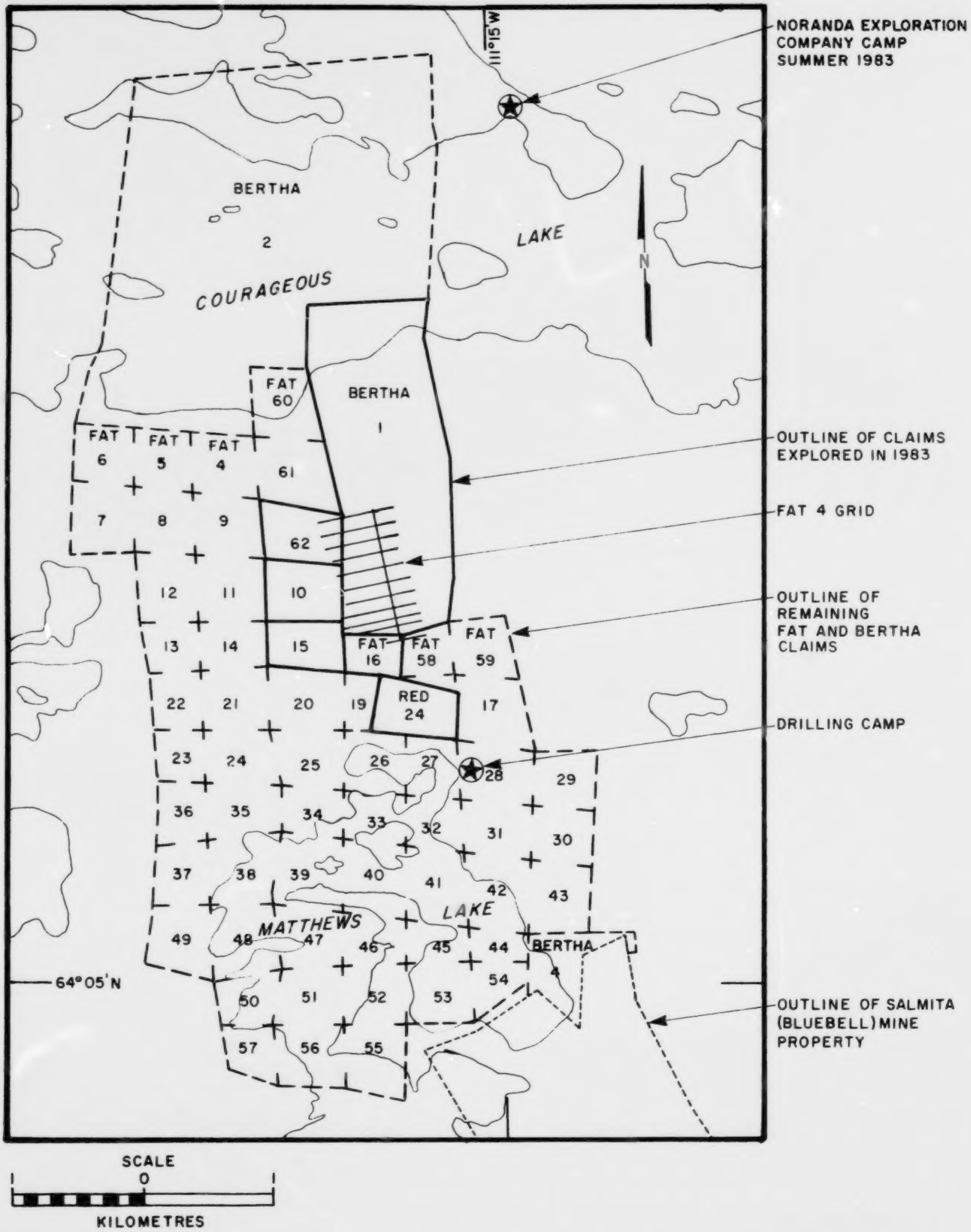

NORANDA EXPLORATION COMPANY CAMP SUMMER 1983
111°15'W
BERTHA 2
COURAGEOUS
LAKE
N
FAT 60
BERTHA 1
FAT 6
FAT 5
FAT 4
61
7
8
9
62
12
11
10
13
14
15
FAT 16
FAT 58
FAT 59
22
21
20
19
RED 24
17
23
24
25
26
27
28
29
36
35
34
33
32
31
30
37
38
39
40
41
42
43
MATTHEWS
LAKE
49
48
47
46
45
44
BERTHA 4
64°05'N
50
51
52
53
54
57
56
55
OUTLINE OF CLAIMS EXPLORED IN 1983
FAT 4 GRID
OUTLINE OF REMAINING FAT AND BERTHA CLAIMS
DRILLING CAMP
OUTLINE OF SALMITA (BLUEBELL) MINE PROPERTY
SCALE
0
1
1
KILOMETRES

FIGURE 8-3: BERTHA and FAT claims. Claims explored in 1983, in relation to topography and other properties.

was by Giant Yellowknife Mines Limited who, in September, 1964, staked the 23 claim RED group primarily as a copper prospect - the RED group surrounded the MC 5 claim which was later restaked by K. Rasmussen as RED 24 and acquired by Giant Yellowknife Mines. The BERTHA 1 claim covers roughly the northern one fifth of the ground previously staked as the RED claims. In April of 1965 the RED claims were explored by magnetometer and EM surveys (Thorpe, 1966) and four diamond drill holes were completed. In 1973, three more holes were drilled (Padgham and others, 1976), of which two tested northerly trending EM conductors in what was later staked as the FAT 16 claim and the BERTHA 1 claim which adjoins it to the north.

All the RED claims except RED 24 had lapsed by 1975. RED 24 lies about 500 m south of BERTHA 1.

In 1976 Noranda Exploration Company Limited flew a combined EM and magnetometer survey of the Courageous Lake-MacKay Lake Volcanic Belt, following which numerous claim groups were staked to cover anomalies (Seaton, 1983a).

Noranda recorded FAT 1-67 in April, 1977. In sequence from south to north, FAT 63 to 67 inclusive occupied the western half of the area later re-staked by Noranda as BERTHA 1.

In 1977 and 1978 several grids on the FAT and the adjoining STOUT claims were geologically mapped and explored by ground geophysics (Seaton, 1983a). The grids cover AEM anomalies. The Fat 4 grid, which covers the southern part of the area occupied by the BERTHA 1 claim and a smaller area on the adjoining FAT claims (parts of FAT 10, 15, 16 and 62) was explored by horizontal loop-and vertical loop-EM, VLF-EM and magnetometer surveys and by 1:2500 geological mapping in 1977, and by a gravity survey in 1978. The AEM and ground EM surveys outlined a north-northwesterly trending conductor in the western part of the grid. The conductor is coincident with a magnetic high and locally with pyrite- and pyrrhotite-bearing felsic volcanics, greywacke and argillite.

One line of gravity surveying showed several small residual gravity peaks, one of which coincides with the conductor axis.

In the spring of 1981 Noranda staked the BERTHA 1 claim and re-established the Fat 4 grid. A sample of what has been variously described as carbonate-rich sheared rhyolite tuff, and carbonate exhalite collected in 1977, in the east central part of the 1000 m-long by 600 m-wide grid, had assayed 19 g/t Au, so exploration was resumed with an emphasis on gold rather than base metals, which had been the 1977 and 1978 targets. The resumed exploration was in joint venture with Getty Mines Limited.

In 1981 the Fat 4 grid was geologically remapped at 1:1000, and a magnetometer survey covered roughly 70% of the Fat 4 grid - the six winglines at the south end of the grid were not re-established and were not surveyed.

DESCRIPTION

The regional geology of 76 D, which includes the greater part of the Courageous Lake-MacKay Lake volcanics, was mapped by Folinsbee (1949). Henderson (1944) mapped 75 M which includes the southern end of the volcanic belt. Both Folinsbee's and Henderson's maps are at 1:253,440 (1 inch to 4 miles).

Moore (1956) mapped the Courageous Lake-MacKay Lake Volcanic Belt at 1:24,000. The volcanic belt consists essentially of a homoclinal, generally easterly younging, sequence of mafic and felsic volcanics. Noranda geologists have divided the sequence into two cycles of volcanism: a western complex consisting of alternating pyroclastics and intermediate flows, and an eastern sequence (the second cycle) comprising mafic metavolcanics to felsic metavolcanic flows and pyroclastics of the Matthews Lake felsic dome. The BERTHA 1 claim is largely underlain by felsic rocks of the dome. Rhyolitic tuffs are the most abundant rocks mapped on the Fat 4 grid. The tuffs commonly contain quartz eyes. Rhyolitic agglomerates have been mapped in the east-central and northeastern parts of the grid.

About 400 m south of the gold showing found in 1977, a second gold occurrence was found. A sample of pyritic carbonate-rich rhyolite lapilli tuff assayed 59 g/t Au.

The two auriferous zones contain fine-grained pyrite, pyrrhotite and arsenopyrite.

Two small areas on the Fat 4 grid were found to be underlain by greywacke and argillite metasediments.

CURRENT WORK AND RESULTS

In 1982, two diamond drill holes, inclined at 45^0 and 65^0 east-northeasterly to probe the 1977 gold discovery in the east-central part of the Fat 4 grid (Fig. 8-3) intersected rock that yielded

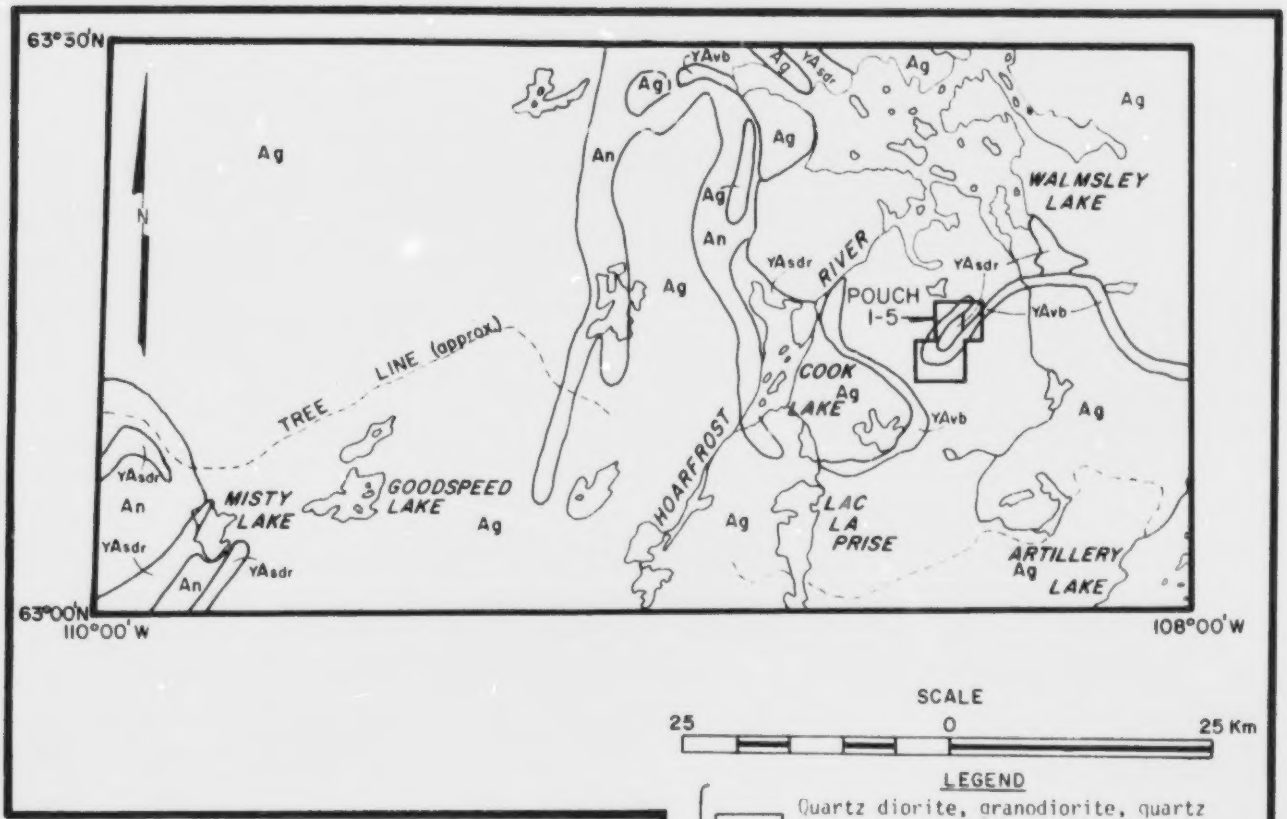

63°30'N
63°00'N
110°00'W
108°00'W
N
Ag
An
YAvb
YAsdr
WALMSLEY LAKE
RIVER
POUCH 1-5
COOK LAKE
HOARFROST
LAC LA PRISE
ARTILLERY LAKE
MISTY LAKE
GOODSPEED LAKE
TREE LINE (approx.)
SCALE
25
0
25 Km
LEGEND
ARCHEAN
Ag Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks
YELLOWKNIFE SUPERGROUP
YAsdr Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAvb Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks

FIGURE 8-4: Walmsley Lake and Hoarfrost River area. Regional geology and property location. Geology from McGlynn (1977).

encouraging gold assays. A total of 290 m was drilled in the two holes.

During 1982 a 900 m by 350 m area of the Fat 4 grid was explored by magnetometer and VLF-EM surveys. The magnetometer survey combined with the results of drilling indicated pyrrhotite concentrations as the main cause of magnetic anomalies. VLF-EM anomalies suggestive of graphitic beds or massive sulphides were not outlined. Lines at 50-m intervals from and including line 300 m N to line 300 m S were in part surveyed by I.P. The I.P. survey delineated zones of disseminated sulphides.

In 1983 much of the BERTHA 1 claim was cursorily prospected, and the entire 0.6 km^2 Fat 4 grid was explored by total field magnetometer and magnetic gradiometer surveys.

Nine holes totalling 1090 m were drilled on the Fat 4 grid during 1983 and as in 1982 encouraging gold assays were reported from drill core.

WALMSLEY LAKE SUPRACRUSTAL BELT

The Walmsley Lake Supracrustal Belt (Fig. 8-4) averages about 2 km wide and extends westerly for about 20 km (straight line distance) from near Artillery Lake, though its sinuous course makes it longer. It is separated from another sinuous and narrow supracrustal belt (the Cook Lake Supracrustal Belt) by about 5 km.

POUCH CLAIM

Canadian Nickel Company Ltd.	Gold, Silver,
Highway 17, West	Base metals.
Copper Cliff, Ont., POM 1NO	75 N/1,2,8
	63°12.5'-63°15.2'N
	108°25'-108°30.2'W

REFERENCES

Folinsbee (1952); McGlynn (1971).

DIAND assessment report 081669.

PROPERTY

POUCH 1-5.

LOCATION

The property (Figs. 8-4, 8-5) is 315 km east-northeasterly of Yellowknife and 13 to 19 km south of Walmsley Lake. POUCH 4 covers the southern half of the property and POUCH 1 the northeastern quarter. The southeastern corner and eastern boundary of POUCH 1 extend into South and North Cavalier Lakes respectively.

The property is largely on 75 N/1.

HISTORY

Gold and sulphides were discovered by the Geological Survey of Canada in 1950 (Folinsbee, 1952).

Details of the date and extent of the earliest staking are not available, but a November, 1952 claim map shows that the property was at that time covered from northeast to southwest by the SAR, CAVALIER and CAV claim groups. The showing on the CAVALIER claims had been tested by x-ray drilling in 1951, though the Mineral Index Sheet prepared by the Mineral Resources Branch, Department of Energy Mines and Resources, states that CAVALIER 1-18 claims were staked in November of 1952 and CAVALIER 19 was staked in July of 1954. The claims were explored by geological mapping in 1954.

From 1951 through 1958 about 1210 m of diamond drilling was completed in 30 holes. In 1958 after North Goldcrest Mines Limited had optioned the property, 940.5 m were diamond drilled in 17 holes on the CAVALIER claims (McGlynn, 1971), and the same year one 47.5 m hole was drilled on the RAD 2 claim, one 46.5 m hole on the PRO 11 claim and two holes totalling 65.5 m were drilled on CON 9 (centred at approximately 63°14'15"N, 108°27'30"W). Most of the holes probed the A1 zone (centred at Beavan Lake, 63°13'N, 108°27'W) and its projected on-strike continuations, namely the A2 zone (to its northeast) and the E zone (to its southwest). The B zone, which strikes sub-parallel to and is about 180 m northwest of the A zone, was tested by four holes of which two were drilled near the A zone and two about 1.5 km farther west to probe the B zone's continuation around the nose of a fold on the CON 9 claim. Other zones drilled were the Contact zone, 1.25 km north-northeasterly of the A zone, and the No. 26 zone on claim PRO 11, the location of which is not known but probably lies northeasterly of and outside the area later staked as POUCH 1.

Dip needle and EM surveys done on the property in 1958 and 1959 outlined numerous highly magnetic zones and several conductors.

POUCH 1 to 4 were recorded for Canadian Nickel Company (Canico) in July of 1981. POUCH 5 was recorded in December of 1981; it is much smaller than the other POUCH claims and occupies ground previously staked as CAVALIER 19.

DESCRIPTION

The POUCH claims cover the western end of a sinuous belt of metavolcanics and metasediments which extends from longitude 108°00'W to 108°30'W, a distance of approximately 25 km (Fig. 8-4). For most of its length the belt is about 2 km wide and consists of volcanics only, flanked by granitoid rocks, but at two localities the metavolcanics are flanked to their north by Yellowknife Supergroup metasediments and the supracrustal belt attains a maximum width of about 5 km. On the POUCH claims, metasediments (Folinsbee, 1952) are exposed in the axial zone of a moderately to steeply north-northeasterly plunging synclinal fold. Canico geologists have suggested that the metasediments mapped by Folinsbee may be better described as felsic tuffs. At the contact between these equivocal schists and a unit of massive and pillowed mafic to intermediate flows, an extensive gossan (the B zone gossan) caps a unit of sulphide-bearing dacitic tuff. The unit has been traced along a strike length of about 3 km and has a maximum width of 50 m. The A1, A2 and E zones are stratigraphically lower in the volcanic sequence and are also formed by a sulphide-bearing dacitic tuff unit, which is capped by a gossan. At the A1, A2 and E zones the volcanics are overturned, since dips are steep to the southeast, but pillows show nearby mafic flows to young to the northwest. A southwest-trending gabbro sill forms the footwall of the A1 and A2 zones, but is separated from the E zone by units of intermediate to mafic

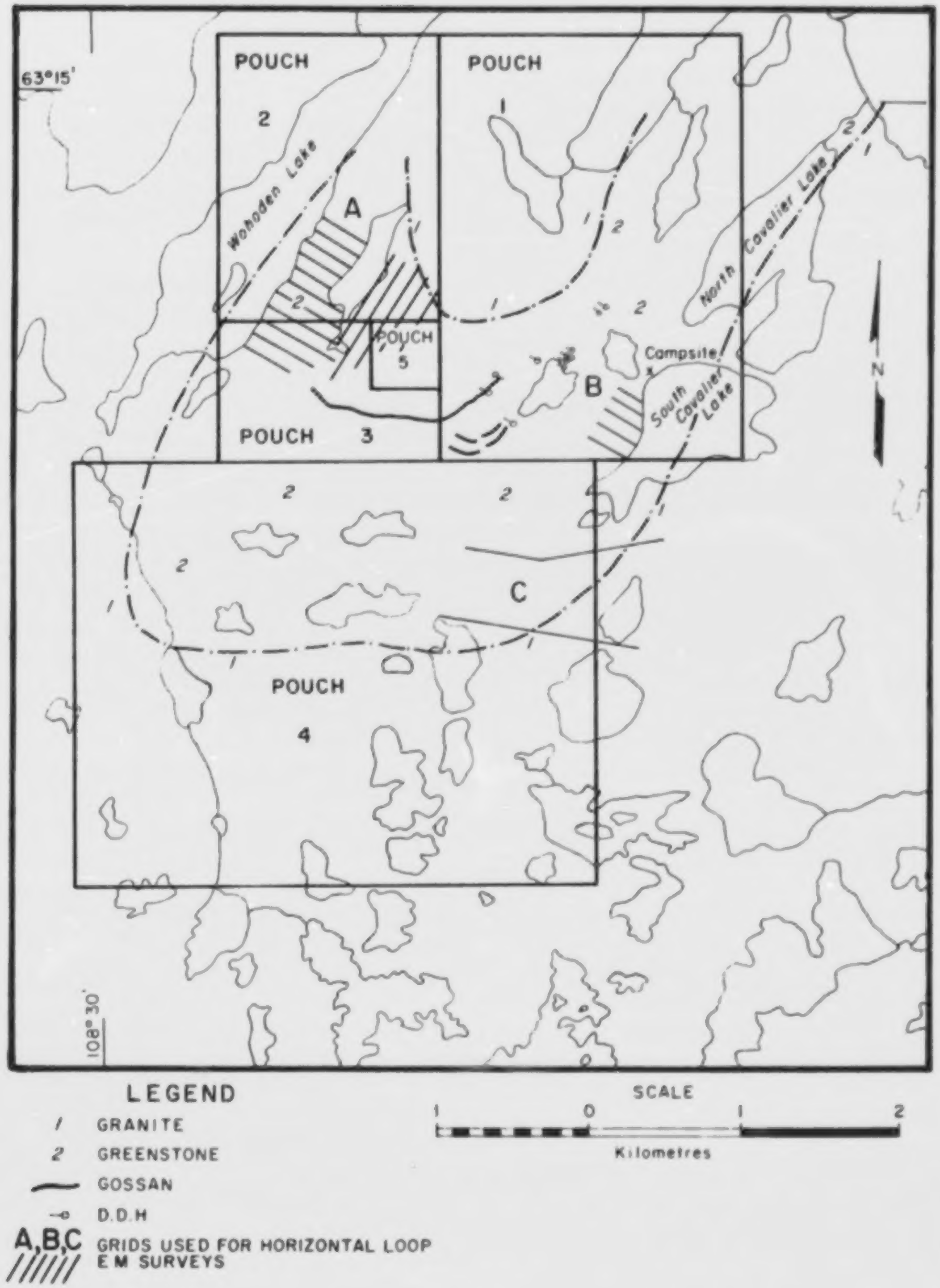

63°15'
108°30'
POUCH 2
POUCH 1
POUCH 5
POUCH 3
POUCH 4
Wahoden Lake
North Cavalier Lake
South Cavalier Lake
Campsite
A
B
C
N
1
2
LEGEND
1 GRANITE
2 GREENSTONE
GOSSAN
D.D.H
A,B,C GRIDS USED FOR HORIZONTAL LOOP EM SURVEYS
SCALE
1
0
1
2
Kilometres

FIGURE 8-5: POUCH claims showing old drill sites, general geology and 1982 grids.

tuff and felsic schist. West of the E zone, the sulphide-bearing tuff can be traced successively westerly and northwesterly around the nose of a northeasterly plunging, overturned synclinal drag fold. The western limb of the drag fold has been intruded in turn by pegmatite and by a northeasterly trending diabase dyke.

Drilling and surface sampling has indicated the best gold and silver assays accompany the highest copper, lead and zinc assays. The best drill-intersection obtained by North Goldcrest Mines graded 6 g/t Au, 139 g/t Ag and 11% combined copper, lead and zinc across 0.3 m.

CURRENT WORK AND RESULTS

In 1982 the POUCH claims were explored by 1:5000 geological mapping and in part by a horizontal loop-EM survey (Fig. 8-5). Gossans and stored drill core were sampled.

It was hoped that magnetic anomalies outlined by the 1958 dip-needle survey might be traced to potentially auriferous magnetic iron formation. Geological mapping, however, did not reveal any iron formation.

The EM surveys did not extend conductors delineated in 1958.

Assay results from more than 400 samples of drill core did not confirm results of previous operators, and chip samples taken across gossans at 75-m intervals or less along strike gave similarly low assays. Four samples assayed from 0.5 to 1.2 ppm Au, but most assayed much less; commonly below 5 ppb Au.

HEALEY LAKE-REGAN LAKE SUPRACRUSTAL BELTS AND SOUTHERN HACKETT RIVER VOLCANIC BELT

A northwesterly trending branch of the northerly trending Healey Lake Supracrustal Belt extends from Healey Lake to Tarantula Lake and thence northerly to the east of the Back River Volcanic Complex to Regan Lake. The northwesterly striking supracrustal rocks include felsic to intermediate volcanics, flanked to the southwest by metasediments, and to the northeast by granitoid gneisses ranging in composition from diorite to granite (Henderson and Thompson, 1982). Figures 8-6 and 8-7, based on McGlynn's (1977) compilation, are used to show property locations relative to gross regional geology, but do not show the Healey Lake Supracrustal Belt or the volcanics between Healey Lake and Tarantula Lake.

The eastern boundary of the Slave Province is still uncertain, but lies at least 15 km to the east of Healey Lake, nearly 35 km east of its position on McGlynn's (1977) compilation.

In the Regan Lake area (Fig. 8-7), Yellowknife Supergroup metasediments bridge the gap between the Back River Volcanic Complex and the Hackett River Volcanic Belt. Locally the metasediments contain iron formation, which in places is auriferous.

Work not described in this section is listed in Table 8-1.

The Hackett River Volcanic Belt (Figs. 8-7, 8-9) extends southeasterly for 100 km from near the confluence of the Mara and Hackett Rivers to the vicinity of Malley Rapids on the Back River. In the Hackett River area the volcanics outline a major syncline, the north limb of which contains the Bathurst Norsemines deposits. The regional geology has been compiled and described by Frith (1981a,b), Frith and Hill (1975), Frith and others (1977), and Frith and Percival (1978).

PROSPECTING PERMITS 814-818

Kidd Creek Mines Ltd.	Gold, Base metals
Box 175, Suite 5000	76 B/2,7
Commerce Court West	64°15'N, 106°45'W
Toronto, Ont., M5L 1E7	

REFERENCES

Henderson and Thompson (1981, 1982); Henderson and others (1982).

DIAND assessment report 081655.

PROPERTY

Prospecting Permits 814-818.

LOCATION

The prospecting permits are at or near Healey Lake, 435 km northeasterly of Yellowknife (Fig. 8-6). The permits cover the following NTS areas:

PROSPECTING PERMIT	NTS SHEETS
814	76 B/2, NE
815	76 B/2, SE
816	76 B/7, NW
817	76 B/7, SE
818	76 B/7, SW

Arms of Healey Lake extend into all permits except for Prospecting Permit 815.

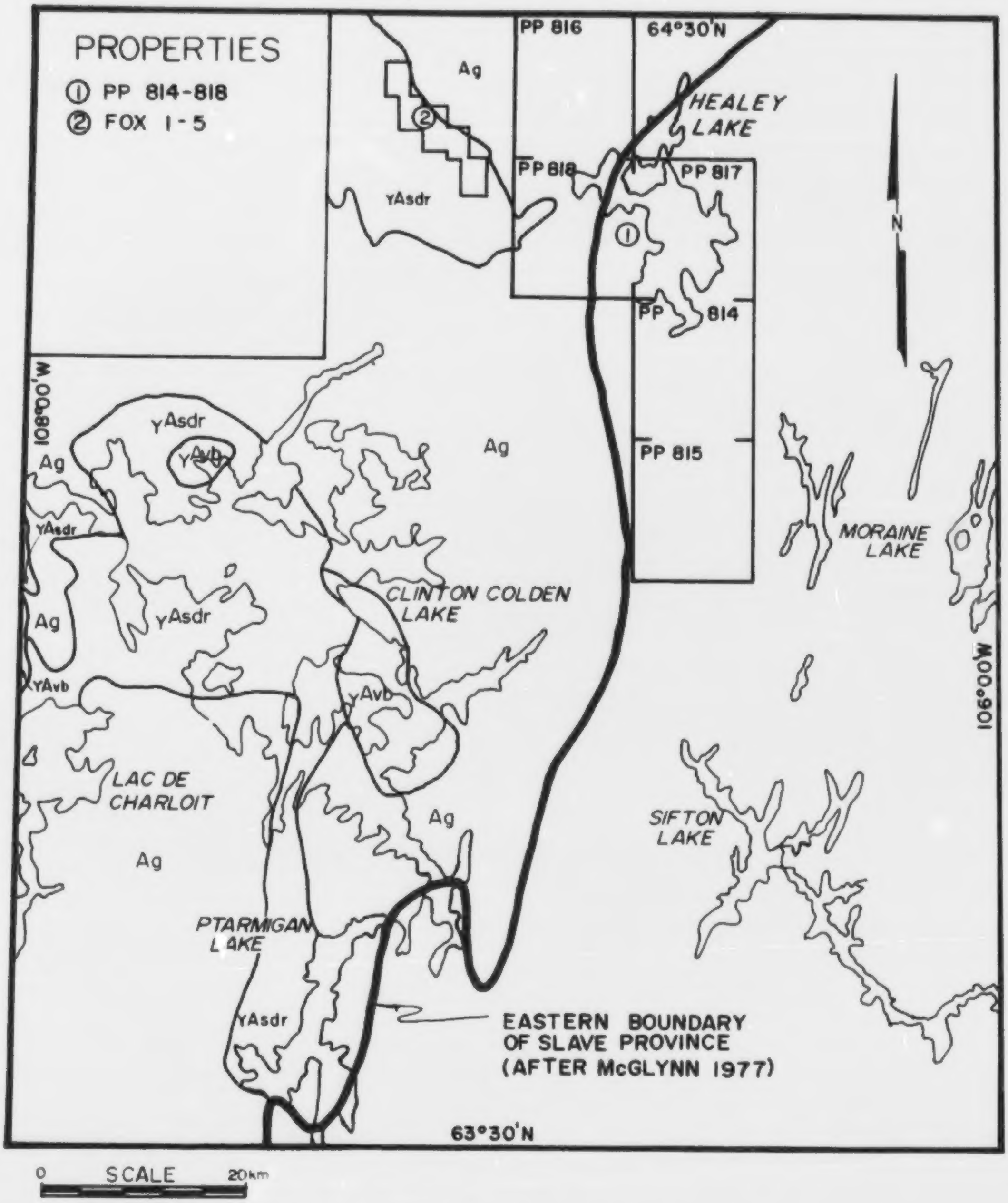

PROPERTIES
① PP 814-818
② FOX 1-5
PP 816
64°30'N
HEALEY LAKE
PP 818
PP 817
PP 814
PP 815
N
Ag
YAsdr
YAvb
108°00'W
106°00'W
CLINTON COLDEN LAKE
MORAINE LAKE
LAC DE CHARLOIT
SIFTON LAKE
PTARMIGAN LAKE
EASTERN BOUNDARY OF SLAVE PROVINCE (AFTER McGLYNN 1977)
63°30'N
0 SCALE 20km

FIGURE 8-6: Regional geology and properties in the Healey Lake Supracrustal Belt. Geology from McGlynn (1977).

LEGEND FOR FIGURES 8-6 AND 8-7

ARCHEAN

Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided

YELLOWKNIFE SUPERGROUP

YAva'	Acidic lava, tuff, ash flow tuff
YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAwp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
YAva	Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks
YAvb	Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks
YAv	Volcanic rocks, undivided

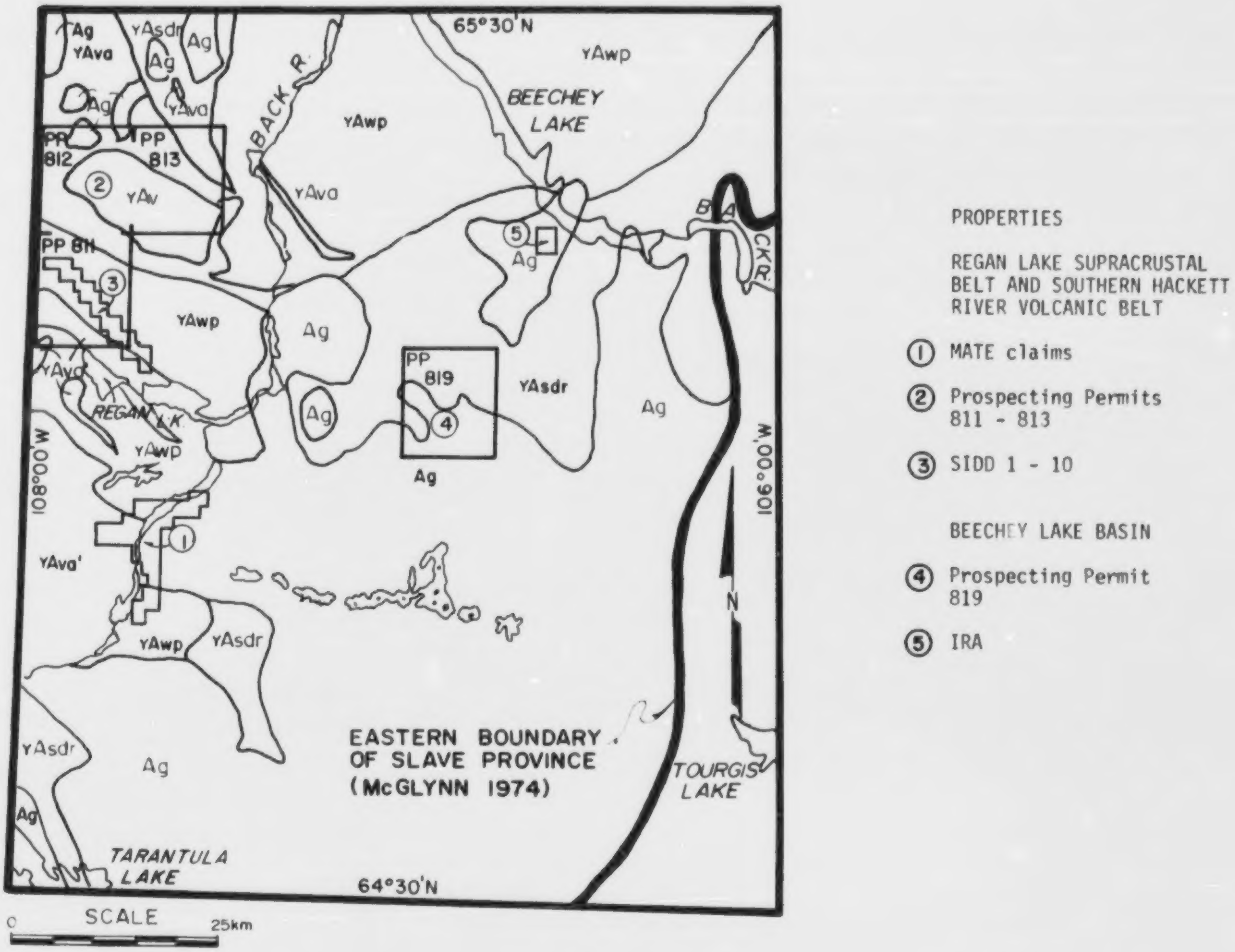

65°30'N
64°30'N
108°00'W
106°00'W
BACK R.
BEECHEY LAKE
REGAN LK.
TOURGIS LAKE
TARANTULA LAKE
PP 812
PP 813
PP 811
PP 819
Ag
YAva
YAsdr
YAwp
YAv
YAva'
N
EASTERN BOUNDARY OF SLAVE PROVINCE (McGLYNN 1974)
0 SCALE 25km
PROPERTIES
REGAN LAKE SUPRACRUSTAL BELT AND SOUTHERN HACKETT RIVER VOLCANIC BELT
① MATE claims
② Prospecting Permits 811 - 813
③ SIDD 1 - 10
BEECHEY LAKE BASIN
④ Prospecting Permit 819
⑤ IRA

FIGURE 8-7: Regional geology and properties in the Regan Lake Supracrustal Belt, southern Hackett River Volcanic Belt, and Beechey Lake Basin. Geology from McGlynn (1977).

HISTORY

Following 1:50,000 regional geological mapping, prospecting and sampling in 1981, Kidd Creek Mines applied for the permits which were granted in February, 1982. Main exploration targets were auriferous iron formation and volcanogenic base metals.

DESCRIPTION

The geology of the Healey Lake area has been mapped and described by Henderson and Thompson (1981, 1982) and by Henderson and others (1982).

CURRENT WORK AND RESULTS

In 1982, volcanics, which form an almost continuous belt trending northerly successively through Prospecting Permits 815 and 814, generally easterly through Prospecting Permits 817 and 818, and again northerly through part of Prospecting Permit 816, were geologically mapped at 1:20,000. Adjoining areas underlain by granitoid rocks and metasediments were also mapped. The belt locally pinches out just south of Healey Lake but reappears on strike to the north. North and west of Healey Lake the volcanic belt follows a sinuous course through Prospecting Permits 817 and 818 and is continuous with volcanics outcropping on the FOX claim group (p. 300 of this report). A northerly trending spur of the main volcanic belt extends into the southeastern part of Prospecting Permit 816. Volcanics range from mafic to felsic.

Metamorphosed iron formation and other rusty zones were mapped. The iron formation is found mainly at volcanic-sediment contacts and also within and between units of the volcanic sequence. Iron formations mapped in the Healey Lake area are mainly of carbonate and silicate facies but include lesser amounts of sulphide and oxide facies.

An airborne Input EM and magnetometer survey of the volcanic belts which cross Prospecting Permits 814-818 detected numerous zones of conductors. Most were interpreted as probably caused by pyritic or graphitic units within metavolcanics or metasediments. A few of the EM anomalies were not explained.

FOX CLAIMS

Kidd Creek Mines Ltd.
Box 175, Suite 5000
Commerce Court West
Toronto, Ont., M5L 1E7

Gold, Base metals
76 B/6
64°24'N, 107°10'W

REFERENCES

Henderson and Thompson (1981, 1982); Henderson and others (1982); Seaton (1984).

DIAND assessment report 081620.

PROPERTY

FOX 1-5.

LOCATION

The property is centred 20 km northwesterly of Healey Lake and 420 km northeasterly of Yellowknife.

HISTORY

The FOX claims (Figs. 8-6, 8-8) were recorded in August of 1981. The claims were staked to cover several large gossans.

After staking, geological mapping and sampling were carried out during 1981 (Seaton, 1984).

DESCRIPTION

The geology of the Healey Lake area has been mapped and described by Henderson and Thompson (1981, 1982) and by Henderson and others (1982).

CURRENT WORK AND RESULTS

An airborne Questor-Input survey was flown over the FOX claims as part of a larger survey covering the Healey Lake area (see Prospecting Permits 814-818, p. 297 of this report).

Geological mapping, prospecting and sampling of the claims, commenced in 1981, was completed. Several zones of iron formation, from lenses a few hundreds of metres in strike length and a few tens of metres wide, to zones several kilometres long and locally as much as 200 m wide were mapped within, and in sediments adjacent to, a northwesterly trending spur of the Healey Lake Volcanic Belt. This spur is composed of mafic to felsic volcanics and has a maximum width of about 2 km. It is flanked to the northeast by granitoid rocks which include granite that is in part pegmatitic and granitic gneiss. The granite is partly at least, intrusive into rocks of the metasediments and metavolcanics, but the granitic gneiss may be basement to the Yellowknife Supergroup. Iron formation mapped by Kidd Creek Mines includes oxide (magnetite), carbonate and silicate facies. The carbonate-facies iron formation is metamorphosed to marble and locally contains a zone of silicates and sulphides (pyrite-pyrrhotite facies). Silicate-facies iron formation also occurs separately. The garnetiferous amphibolites of the silicate facies locally contain small lenses of pyrite-pyrrhotite. The iron-formation lenses and zones are enclosed by felsic or mafic volcanics. They also are found at the contacts between felsic and intermediate volcanics, between felsic volcanics and sediments and between mafic volcanics and sediments. Intermediate and mafic volcanics outcrop to the southwest of the felsic volcanics from which they are partly separated by a tongue of metasediments which pinches out at the southeastern end of the property on FOX 5. Towards the northwestern end of the property, only felsic volcanics are found, flanked on both sides by metasediments that are probably in part volcaniclastic. The spur of volcanics pinches out on FOX 4 claim and a zone of iron formation extends northwesterly from the pinch-out, for about 5 km beyond the FOX claims boundary.

On FOX 5 samples from a thin graphitic exhalite averaged 1% Zn and 0.3% Cu with geochemically anomalous contents of arsenic and gold.

Samples of silicate-sulphide-facies iron formation showed geochemically anomalous concentrations of gold, silver, arsenic, copper, lead and zinc.

Generally, sampling of gossans and iron formations on the FOX claims did not give encouraging results. The sillimanite isograd has been mapped by Henderson and Thompson (1982) as cutting the metasediments of the property area obliquely to, and more westerly than, the strike of the metavolcanics. Kidd Creek Mines geologists have noted occurrences of cordierite, andalusite and garnet. They report that

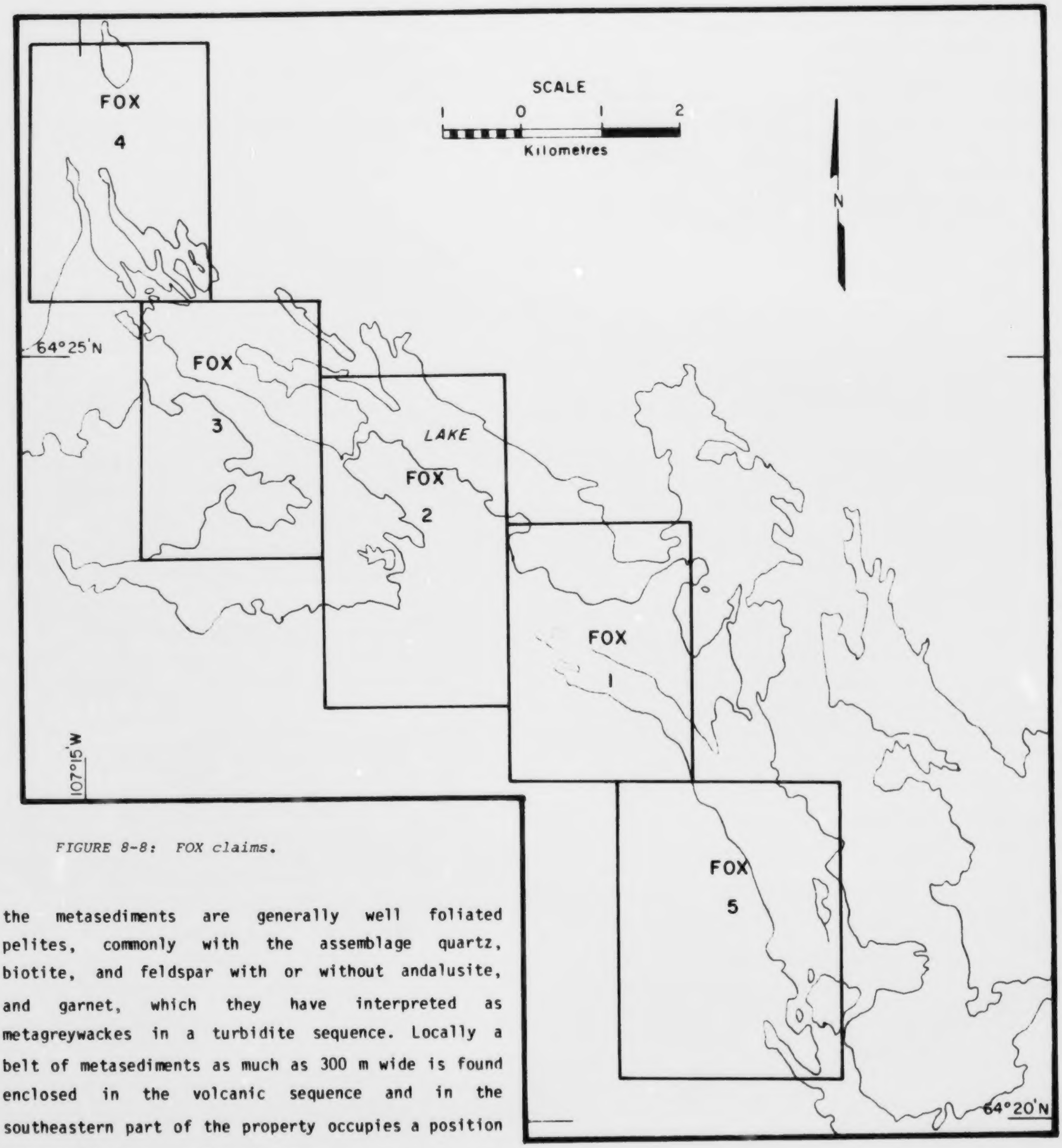


FIGURE 8-8: FOX claims.

the metasediments are generally well foliated pelites, commonly with the assemblage quartz, biotite, and feldspar with or without andalusite, and garnet, which they have interpreted as metagreywackes in a turbidite sequence. Locally a belt of metasediments as much as 300 m wide is found enclosed in the volcanic sequence and in the southeastern part of the property occupies a position between felsic and mafic volcanics.

Foliation is generally parallel to the strike of the rock units and dips steeply to the southwest. The combined airborne Input EM and magnetometer survey delineated many mostly formational conductors. Where these are coincident with magnetic highs they have been interpreted in the light of geological mapping as caused by mixed facies of iron formation. Where the conductors are not coincident with magnetic highs that are believed to be caused by graphitic zones, which may also contain concentrations of pyrite.

PROSPECTING PERMITS 811-813

Noranda Exploration Co. Ltd.	Copper, Zinc,
4 - 2130 Notre Dame Ave.	Silver, Gold
Winnipeg, Man., R3H OK1	76 G/4, 5
	65°16'N, 107°46'W

REFERENCES

Caine and others (1981); Frith (1981a,b); Frith and others (1977); Frith and Percival (1978); Lambert (1981); Lord (1951); Schiller (1965); Schiller and Hornbrook (1964); Seaton (1978, 1983b, 1984); Tremblay (1971); Wright (1967).

DIAND assessment report 081610.

PROPERTY

Prospecting Permits 811, 812, 813.

LOCATION

The permits are 450 km northeasterly of Yellowknife (Fig. 8-7). Prospecting Permit 811 covers part of the Regan Lake Volcanic Belt. Permits 812 and 813 cover part of the Southern Hackett River Volcanic Belt.

HISTORY

Base metal, silver and gold exploration has been carried out in the prospecting permit region since the late 1940's, when gold was discovered on the ALGOOD claim group near Regan Lake (Lord, 1951). Since then portions of the area have been staked as the DON, ACK, QIK, DAWN, ORC, ORB, WAN, MB, DT, CP, AD and HUNT claims (Schiller, 1965; Schiller and Hornbrook, 1964; Caine and others, 1981). More recently, the MUSK group of claims, in the northern half of Prospecting Permit 813, has undergone considerable exploration, which has resulted in the discovery of the MUSK silver-copper-zinc-lead deposits (Seaton 1978, 1983b, 1984).

Prospecting Permits 811, 812 and 813 were issued to Noranda Exploration in February of 1981.

DESCRIPTION

The regional geology of the area is shown in Figure 8-7. Frith (1981a,b), Tremblay (1971) and Wright (1967) have compiled geological maps; the former two at 1:125,000 and Wright at 1:1,000,000. Work has also been done by Frith and Percival (1978), and Frith and others (1977). A map of the southern part of the area has also been compiled by Lambert (1981) at 1:50,000.

CURRENT WORK AND RESULTS

Geological mapping and prospecting were undertaken over the permit areas in the summer of 1982. Maps were compiled at 1:31,680 scale for the three permits and another more detailed map at 1:15,068.5 scale for Prospecting Permit 811.

Permits 812 and 813 are underlain predominantly by east-southeasterly trending Archean metavolcanics of dacitic to rhyolitic composition. These are overlain in places by Archean metasediments. The axis of a large antiform, which covers the three permit areas, strikes northwesterly through the centre of permit 812. Numerous pyritic gossans were found on both permits. Samples taken were analyzed for copper, zinc, lead, nickel, silver and gold. Several copper-zinc showings, mainly in rhyolitic tuffs, were located on Prospecting Permit 813, but no significant showings were found on Prospecting Permit 812.

Prospecting Permit 811 is underlain predominantly by metasediments interbedded with silicate-oxide facies iron formation. Numerous gold showings were discovered associated with arsenopyrite in iron formation or in quartz veins cutting through the iron formation.

BEECHEY LAKE BASIN

The term "Beechey Lake Basin" is used in this report to denote the large area of deposition of metasedimentary rocks centred at Beechey Lake (Figs. 8-7, 8-9). Metamorphic grade increases northwesterly and southeasterly, away from the northwestern end of Beechey Lake. The Beechey Lake Basin adjoins the Hackett River Volcanic Belt (Frith, 1981a,b).

PROSPECTING PERMIT 819

Kidd Creek Mines Ltd.	Gold, Silver,
Box 175, Suite 5000	Base metals
Commerce Court West	76 G/2 SW
Toronto, Ont., M5L 1E7	65°3.25'N, 106°52.5'W

REFERENCES

Cameron and Durham (1974); Frith (1981a,b,c, 1982); Frith and Loveridge (1982); Frith and Percival (1978); Gibbins and others (1977); Seaton (1978); Tremblay (1971); Wright (1957, 1967).

DIAND assessment reports 081656, 080176, 061392, 061344.

PROPERTY

Prospecting Permit 819.

LOCATION

Prospecting Permit 819 is centred 470 km northeasterly of Yellowknife. Casey Lake is in the northwestern part of the permit area.

HISTORY

Wright (1957, 1967) did a preliminary geological reconnaissance and noted a showing of pyrite in granite near Casey Lake. Tremblay (1971) later mapped the Beechey Lake area, which includes Casey Lake.

Prospecting Permit 328, covering 76 G/2, was granted to DuPont of Canada Exploration Ltd. on April 1, 1974 (Gibbins and others, 1977; Seaton, 1978). The permit was explored by geological mapping and prospecting during 1974 (DIAND assessment report 061344). During this work conformable lenses and zones of pyritic chert, pyritic and locally garnetiferous amphibolite, and pyritic, graphitic schist were noted extending north over a distance of 6.5 km from 65°00'N, 106°52'W. One sample of pyritic rock assayed 21 g/t Au. Zinc assays from pyritic beds ranged from trace to 0.4% and copper assays from trace to 0.1%.

In 1975, DuPont continued geological mapping and rock and soil sampling to evaluate gold showings found in 1974. Detailed work was concentrated south and east of Casey Lake and at Long Lake, north of Casey Lake. Samples of sulphide-rich rocks gave no encouraging gold assays (DIAND assessment report 061392).

Prospecting Permit 328 enclosed the Noranda Exploration Co. Ltd. 81-claim NEC group, which was staked in March, 1974, to cover a geochemical lake sediment anomaly discovered during a 1972-1973 regional survey by the Geological Survey of Canada (Cameron and Durham, 1974). Noranda explored the NEC claims by geological mapping and prospecting, and a much larger surrounding area by a combined airborne (Input) EM and magnetometer survey (DIAND assessment report 080176). The geological survey delineated a thin unit of black graphitic slate adjacent and southwest of a thin unit of mafic and commonly pillowed volcanics. These two adjoining units are enclosed in quartz-mica schists, phyllite and greywacke. Several formational conductors delineated by the airborne survey were coincident with or near and parallel to the graphitic unit. Prospecting did not discover any showings.

DESCRIPTION

The northern two-thirds of Prospecting Permit 819 is underlain mainly by metasediments of the Yellowknife Supergroup and the southern third by biotite muscovite granite and (west of Casey Lake) granodiorite, intrusive into the metasediments (Figs. 8-7, 8-9). Intermediate to mafic volcanics underlie a relatively small area east and north of Casey Lake where, according to Frith (1981b,c), they lie on the limbs and near the nose of a northwesterly plunging syncline. That the fold is synclinal seems rather difficult to reconcile with the gross regional picture, which suggests that the Back River Group volcanics (Frith and Percival, 1978) - of which the Casey Lake volcanics are part - are on the limbs of a southeasterly plunging anticline (Malley Rapids Anticlinorium), in which the Back River Group volcanics fringe the older Hackett River Group volcanics from which they are, in part, separated by a belt of metasediments. Except in the northwestern corner of the permit, the supracrustal rocks underlying Prospecting Permit 819 lie on the high-grade side of the cordierite-staurolite isograd.

Frith (1981a) has compiled a geological map of the Nose Lake area, which adjoins the Beechey Lake area, and Frith and Loveridge (1982) have discussed geochronology of granitoid rocks, metavolcanics and metamorphism in the northern Slave Province.

CURRENT WORK AND RESULTS

A 1:1500 geological map of roughly 40km^2 southeast of Casey Lake was prepared. The mapped area covers the synform mapped by Frith (1981b). Kidd Creek Mines geologists also described the fold as synformal. The axial zone of the fold is occupied by metasediments which are flanked on oneside by a belt of iron formation (less than 100 m thick), intermediate volcanics and mafic metavolcanics that together attain a maximum thickness of about 300 m. The metavolcanics pinch out on the northeastern limb of the fold about 4 km south-easterly of Casey Lake, beyond which iron formation, traced northwesterly to the edge of the map area, is both overlain and underlain by metasediments. Near the fold nose and along the southwestern limb of the fold, granitic

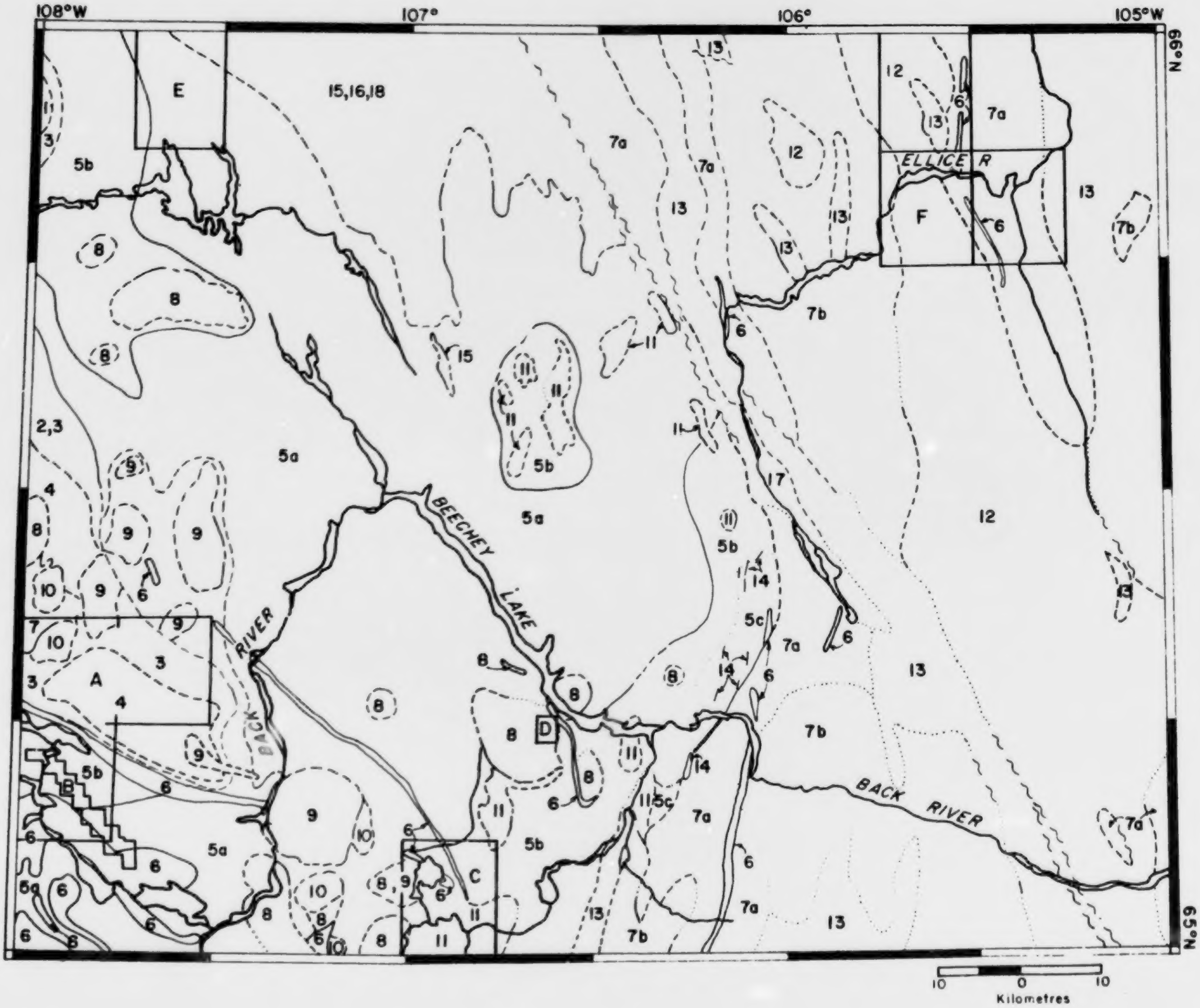

108°W
107°
106°
105°W
66°N
65°N
E
15,16,18
5b
7a
13
12
6
ELLICE R
F
7b
8
15
11
2,3
4
5a
9
10
7
A
3
RIVER
BACK
B
BEECHEY
LAKE
5c
17
14
D
C
BACK RIVER
10
0
10
Kilometres

FIGURE 8-9: Regional geology and properties in the Regan Lake Supracrustal Belt, Beechey Lake Basin, and the Ellice River areas. Geology modified after Frith (1981 a,b,c) and Frith, Fyson and Hill (1977).

PROPERTIES

REGAN LAKE SUPRACRUSTAL BELT

Ⓐ Prospecting Permits 811 - 813

Ⓑ SIDD 1 - 10

BEECHEY LAKE BASIN

Ⓒ Prospecting Permit 819

Ⓓ IRA

Ⓔ Prospecting Permit 973

ELLICE RIVER AREA

Ⓕ Prospecting Permits 820 - 822

rocks have intruded metavolcanics and metasediments. A zone of migmatite has been mapped around the fold nose. Supracrustal rocks are locally preserved as lenses a few hundreds of metres long, enclosed in granitic rocks.

The iron formation, which is mainly silicate facies, locally contains as much as 15% combined pyrite and pyrrhotite. Minor oxide-facies iron formation is reported. Systematic sampling of the iron formation did not find geochemically anomalous concentrations of either gold or arsenic.

LEGEND FOR FIGURE 8-9

PROTEROZOIC	18	Gabbro
	17	Ellice River Fm: conglomerate, arkose, shale, sandstone, carbonate
	16	Burnside River Fm: pink quartzite, conglomerate, sandstone, shale, slate
	15	Western River Fm: greywacke, argillite, sandstone, carbonate, conglomerate
AGE UNCERTAIN	14	Pegmatite
	13	Gneiss and migmatite of uncertain origin, includes amphibolite, dioritic, and mylonitic granitized rocks
ARCHEAN	12	Augen K-feldspar gneiss, predominantly granodioritic
	11	Biotite muscovite granite
	8–10	REGAN INTRUSIVE SUITE
	10	tonalite, diorite, quartz diorite
	9	granite
	8	granodiorite
	7	Migmatitic gneiss and migmatite (probably derived from Yellowknife Supergroup)
	7a	biotite gneisses with 10-50% leucosomes
	7b	migmatite with more than 50% leucosomes
	6	Back Group: andesite, basalt and dacite flows, breccia and tuff
	5	BEECHEY LAKE GROUP
	5a	greywacke, mudstone, carbonaceous mudstone
	5b	prophyroblastic gneiss and schist derived from 5a
	5c	biotite gneiss with no porphyroblasts
	1–4	HACKETT RIVER GROUP
	4	dacite, metamorphosed, deformed
	3	felsic and basic flows, fragmental volcanics, volcanic sediments, iron formation
	2	andesite, basalt and dacite flows and fragmentals
	1	biotite-chlorite schist, sericitic schist, mafic amphibole gneiss and quartzofeldspathic gneiss derived from volcanogenic sediments

IRA CLAIM

Kidd Creek Mines Ltd.
P.O. Box 175, Suite 5000
Commerce Court West
Toronto, Ont., M5L 1E7

Silver,Gold,
Copper,Molybdenum
76 G/2,7
65°15'N, 106°40'W

REFERENCES

Frith (1981b,c; 1982); Frith and Loveridge (1982); Frith and Percival (1978); Hill and Frith (1982).

DIAND assessment report 081682.

PROPERTY

IRA.

LOCATION

The IRA claim (Figs. 8-7, 8-9) is at the southeastern end of Beechey Lake (which is a wide, 50-km-long reach of the Back River) and 490 km northeasterly of Yellowknife.

HISTORY

The claim was staked in 1981 to cover chalcopyrite showings discovered earlier the same year during regional geological reconnaissance mapping.

DESCRIPTION

The regional geology of the Beechey Lake area has been compiled and described by Frith (1981b,c; 1982); the stratigraphy described by Frith and Percival (1978); and the geochronology of the adjoining Nose Lake-Beechey Lake area by Frith and Loveridge (1982). Hill and Frith (1982) describe the petrology of the Regan Lake Intrusive Suite.

The IRA claim is underlain by granodiorite of the Regan Lake Intrusive Suite (Hill and Frith, 1982) and by Yellowknife Supergroup supracrustals. The granodiorite underlies about two-thirds of the claim (mainly the western part). Granodiorite also underlies the northeastern corner of the claim. Between the western and eastern exposures of granodiorite a belt of supracrustals, shown as metavolcanics by Frith (1981b; 1982) and as mainly metasediments by Kidd Creek Mines, trends northwesterly and underlies much of the eastern boundary of the IRA claim. Where the belt cuts the

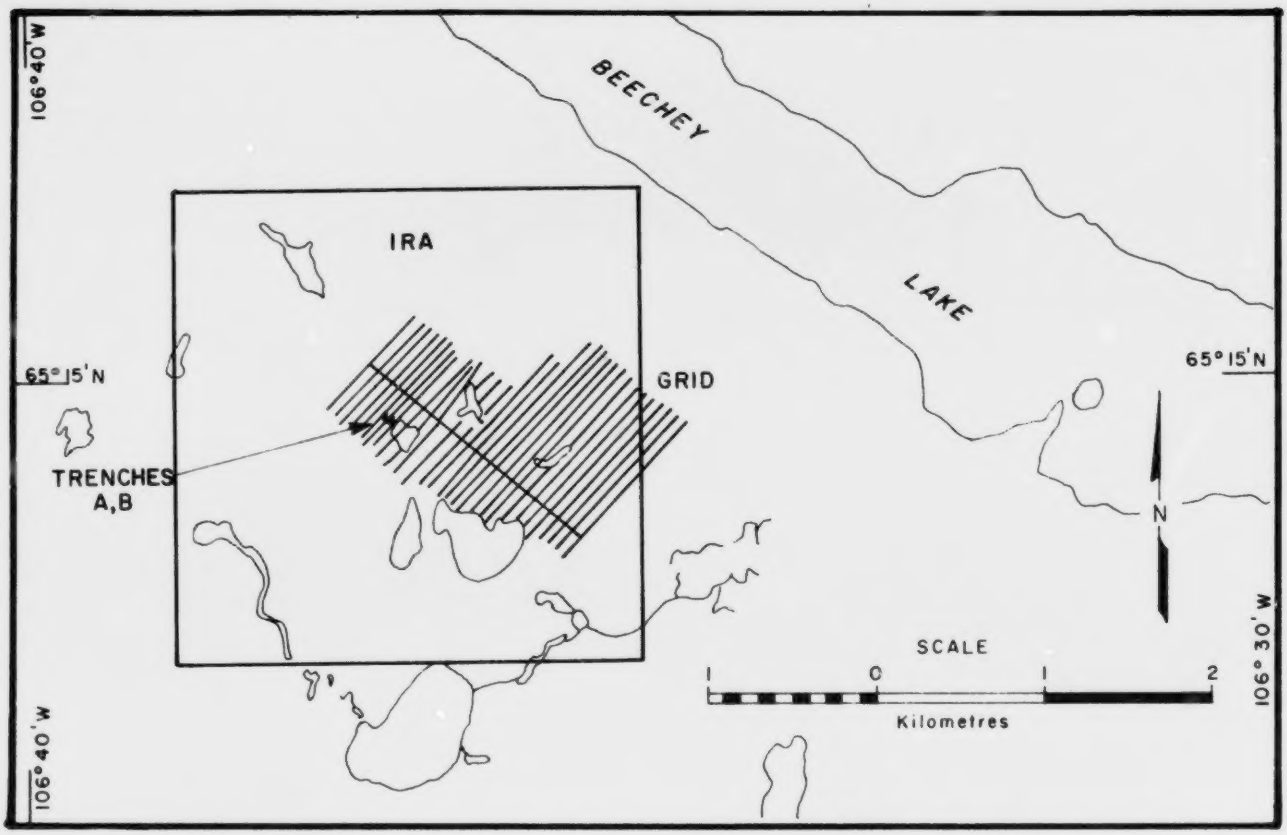


FIGURE 8-10: IRA claim. Claim and grid location.

northern boundary of the claim, it is about 1 km wide.

CURRENT WORK AND RESULTS

A faulted zone of chalcopyrite showings in quartz veins with concentrations of silver, gold and molybdenite was traced for about 1300 m. The zone, which for the most part cuts granodiorite, was explored by establishing a grid in the central part of the claims, which was geologically mapped at 1:2000 and surveyed by VLF and horizontal loop EM. One showing was trenched and sampled.

The geological survey of the roughly 2 km^2 grid shows a few small areas to be underlain by intermediate volcanics that outcrop between metasediments and granodiorite and as small xenoliths within the granodiorite.

An EM conductor was delineated.

PROSPECTING PERMIT 973	Gold
Trigg, Woollett, Olson	76 G/14
Consulting Ltd.	65°56'N, 107°22'W

10504 - 103rd St.
Edmonton, Alta., T5H 2V4

REFERENCES

Frith (1981a); Frith and others (1977).
DIAND assessment report 081705.

PROPERTY

Prospecting Permit 973.

LOCATION

The permit area is 520 km northeasterly of Yellowknife (Fig. 8-9).

HISTORY

In 1982, Trigg, Woollett Consulting Ltd., on behalf of the Back River Joint Venture, undertook reconnaissance prospecting and rock sampling. There is no record in the DIAND archives of exploration work conducted in this area prior to this.

Prospecting Permit 973 was issued to Trigg, Woollett, Olson Consulting Ltd., in February of 1983, on behalf of the Back River Joint Venture. Trigg, Woollett, Olson Consulting Ltd. has a retained interest in, and is the operator for, Back River Joint Venture.

DESCRIPTION

The regional geology is shown in Figure 8-9. According to Frith (1981a) and Frith and others (1977), the area is predominantly underlain by Archean Beechey Lake Group sediments. These comprise shales and greywackes, with minor northwesterly trending, exhalite-facies iron formation. Locally, granodiorite stocks of Archean age have intruded the sediments. Numerous northwesterly trending gabbro dykes of Helikian age associated with the Mackenzie Diabase dyke swarm have intruded the sediments.

CURRENT WORK AND RESULTS

In the summer of 1983, Prospecting Permit 973 was explored for gold. The work comprised reconnaissance and detailed geological mapping, prospecting, trenching, rock and soil sampling, and magnetometer and VLF-EM surveying.

ELLICE RIVER AREA

This area (Fig. 8-9), which covers some of the higher reaches of the Ellice River and its drainage system, was included in the Churchill Province (McGlynn, 1977). However, migmatitic gneiss and migmatites, remapped by Frith (1981b), are thought to have been derived from Yellowknife Supergroup rocks. Therefore, this area would be more aptly placed within the Slave Structural Province.

PROSPECTING PERMITS 820-822

Kidd Creek Mines Ltd. — Copper, Lead, Zinc
P.O. Box 175, Suite 5000 — 76 H/13,14
Commerce Court West — 65°51'N, 105°32'W
Toronto, Ont., M5L 1E7

REFERENCES

Frith (1981b,c); Thorpe (1972).

DIAND assessment reports 081657, 018784 to 018786.

PROPERTY

Prospecting Permits 820, 821, 822.

LOCATION

The prospecting permits are 580 km northeasterly of Yellowknife and in the Ellice River area (Fig. 8-9).

HISTORY

The area was first explored in 1967 for uranium by the Northwest Syndicate using airborne scintillometer and gamma ray spectrometer equipment. In 1968, several claims were staked and prospecting permits granted. The Eastern Mackenzie Syndicate, Maria Mining Corporation Ltd., and Duvan Copper Company Ltd. held the A claim group, the D 21-40 claims and the D 1-20 claims respectively (Thorpe, 1972). These claims covered part of what is now Prospecting Permits 820 to 822. The Eastern Mackenzie Syndicate undertook exploration over these properties comprising airborne gamma ray spectro-meter surveying, prospecting and reconnaissance geological mapping (DIAND assessment reports 018784 to 018786).

Prospecting Permits 820, 821 and 822 were issued to Kidd Creek Mines in February of 1982.

DESCRIPTION

The regional geology is shown in Figure 8-9. The permits are underlain predominantly by Archean granodioritic gneiss, migmatitic gneiss and migmatite. On the eastern edges of Prospecting Permits 820 and 821 and the western edge of Prospecting Permit 822 is a northerly trending belt of intermediate to mafic volcanics (Frith, 1981b,c).

CURRENT WORK AND RESULTS

Airborne INPUT and magnetic surveys were conducted over the permit areas in June of 1982. Flight lines were 250 m apart. The final maps were compiled at 1:20,000 scale.

Several strong EM conductors were outlined; these do not appear to have any consistent correlation with the magnetic data. The magnetic features were predominantly northerly trending. Most of the conductors are believed to be caused by graphitic horizons in the metasediments and metavolcanics.

HOPE BAY VOLCANIC BELT

This supracrustal belt (Fig. 8-11) is largely composed of volcanic rocks. Felsic volcanics are abundant, but less so than mafic volcanics. The belt

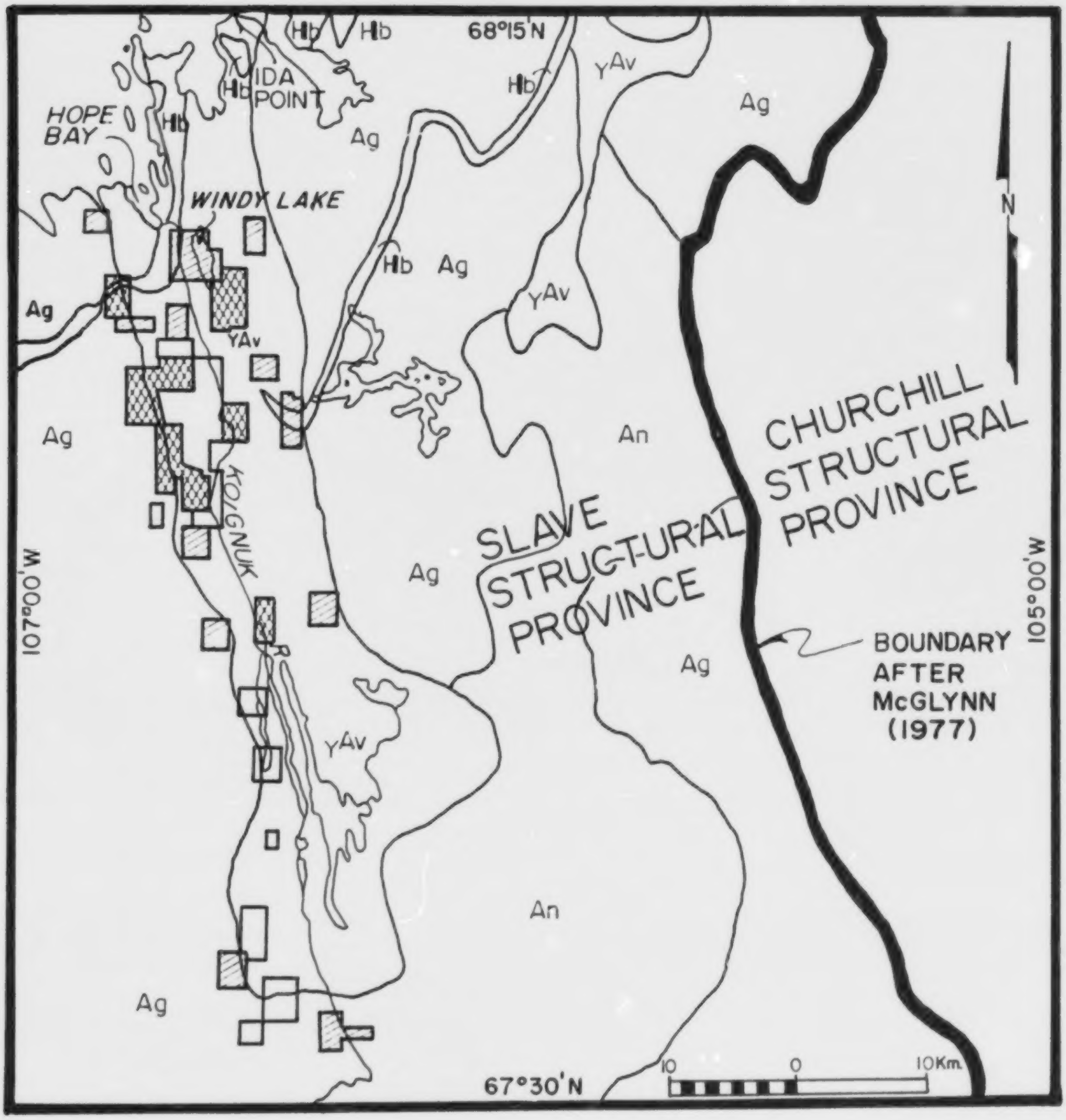

Hb
Hb
68°15'N
IDA POINT
Hb
HOPE BAY
Hb
Ag
YAv
Hb
Ag
WINDY LAKE
Hb
Ag
Ag
YAv
YAv
Ag
KOIGNUK
An
CHURCHILL STRUCTURAL PROVINCE
SLAVE STRUCTURAL PROVINCE
Ag
107°00'W
105°00'W
BOUNDARY AFTER McGLYNN (1977)
Ag
YAv
An
Ag
67°30'N
10
0
10Km.
N

FIGURE 8-11: Regional geology and properties in the Hope Bay Volcanic Belt. Geology from McGlynn (1977).

PROPERTIES

▨ Ida Point Minerals Ltd. 1981 claims

▧ Lynx Canada Explorations Ltd. 1982/ 1983 claims

☐ Noranda Exploration Co. Ltd. 1982/ 1983 claims

LEGEND FOR FIGURE 8-11

PROTEROZOIC

Hb	Gabbro sills and sheets. Includes Coronation and Franklin intrusions

ARCHEAN

Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks

YELLOWKNIFE SUPERGROUP

YAv	Volcanic rocks, undivided

is about 80 km long and averages 15 km in width; it trends north-northwesterly. Its northern end is covered by the waters of Melville Sound.

ADA-ZEL CLAIMS

Ida Point Minerals Ltd.
520 - 25 Adelaide St. E.
Toronto, Ont., M5C 1Y2

Gold, Silver, Copper
76 O/9,10,15,16;
77 A/3
67°30' to 68°15'N,
106°20' to 106°50'W

REFERENCES

Caine and others (1981); Fraser (1964); Gibbins and others (1977); Padgham and others (1978); Padgham and others (1975, 1976); Seaton (1978); Thorpe (1972).

DIAND assessment report 081734.

PROPERTY

ADA, BAG, BAK, BOK, CAM, CAN, DAVE, ED, EVE, GOOD, HEWN, HEWS, JOE, JON, LYNX, MAR, MATT, MEN, NEL, NIC, RICH, SON, TIN, TOO and ZEL claims.

LOCATION

The claims are in the Hope Bay area, 725 km northeasterly of Yellowknife (Fig. 8-11).

HISTORY

The area of the claims was first prospected by Roberts Mining Company and Duncan R. Derry Ltd. in the late 1960's (Caine and others, 1981). Exploration in this area in the 1970's was dominated by the Hope Bay Syndicate, who opened the Hope Bay silver mine in 1973, which ceased production in 1975 (Padgham and others, 1978; Padgham and others, 1975, 1976; Gibbins and others, 1977; Seaton, 1978). In the 1970's, Perry River Nickel Mines Ltd. acquired an interest in the WAN claims (76 O/16, 77 A/3) and work done is summarized by Seaton (1978). A more detailed history of the claims area can be found in the abovementioned references or in Thorpe (1972).

The ADA - ZEL claims were recorded by Ida Point Minerals Ltd. in August, 1981.

DESCRIPTION

Figure 8-11 shows the regional geology of the Hope Bay area. Geological data has been compiled by Fraser (1964) at 1:506,880.

CURRENT WORK AND RESULTS

The claims (Figs. 8-12 to 8-14, 8-16) were geologically mapped and prospected in the summer of 1981. Five trenches were dug on the BAG, DAVE, JON, LYNX and RICH claims. Samples from trenches, gossans, and quartz veins were analyzed for gold and silver. Two samples were also analyzed for copper. Gold and copper samples locally gave encouraging assays. No samples were taken from the ADA, ED, HEWS and MEN claims.

HOPE BAY PROJECT
(LYNX CANADA EXPLORATIONS LTD. CLAIMS)

Noranda Exploration Co. Ltd.,
4 - 2130 Notre Dame Ave.,
Winnipeg, Man., R3H OK1

Gold, Silver,
Base metals
76 O/9,10,15,16
77 A/3
68°07'N, 106°41'W

REFERENCES

Caine and others (1981); Fraser (1964); Gibbins and others (1977); Padgham and others (1976); Seaton (1984); Thorpe (1972).

DIAND assessment report 081713.

PROPERTY

BOK, BAK, CAN, JON, LYNX, MEN.
ADA, EVE, GOOD, NEL, RICH.

The first six claims were optioned by Noranda Exploration Company Ltd. from Lynx Canada Exploration Ltd. subject to prior agreements between Lynx Canada and Ida Point Minerals Ltd.

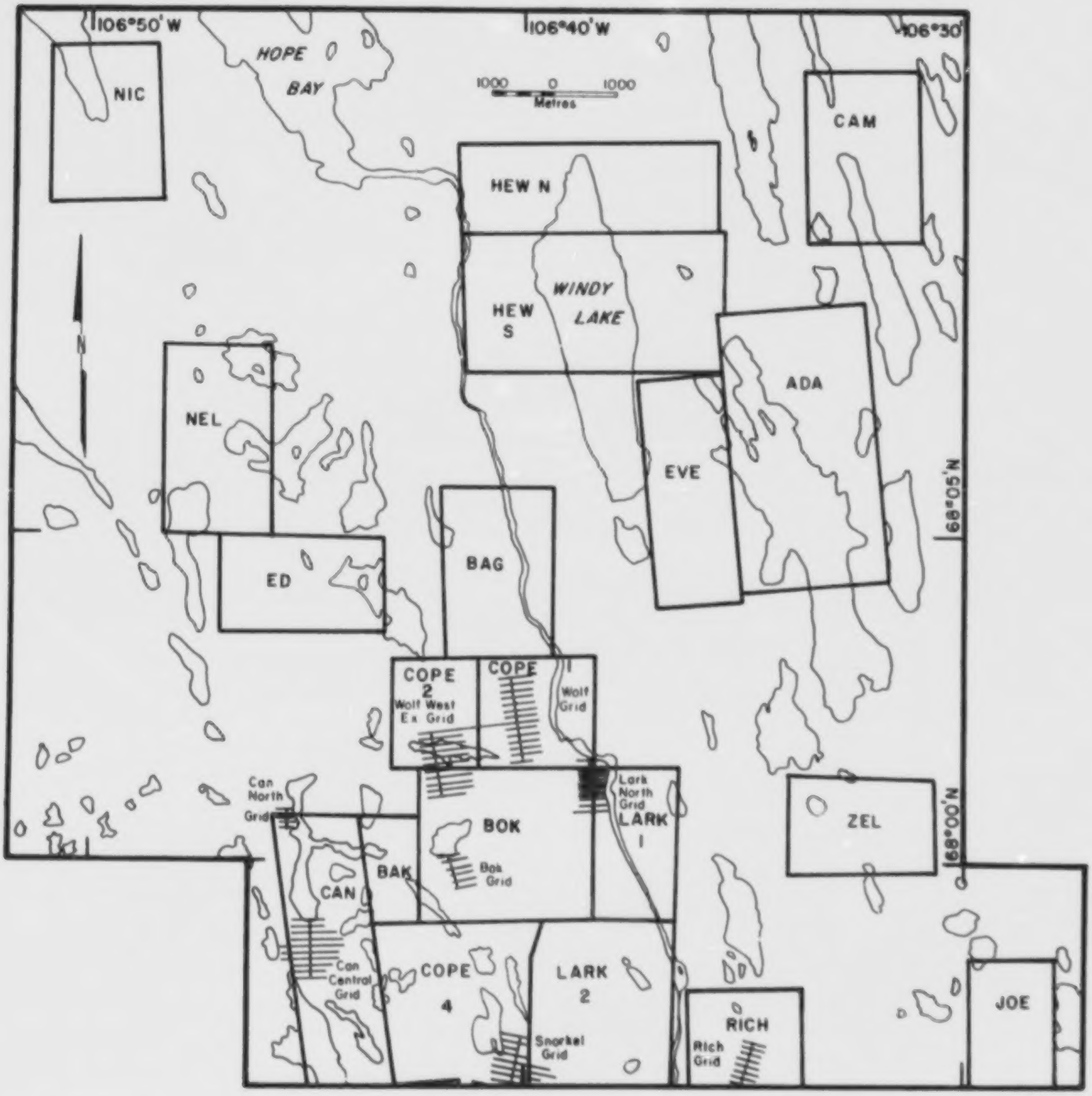

106°50'W
HOPE BAY
106°40'W
106°30'
1000 0 1000
Metres
NIC
CAM
HEW N
HEW S
WINDY LAKE
N
NEL
ADA
EVE
68°05'N
ED
BAG
COPE 2
Wolf West Ex Grid
COPE
Wolf Grid
Can North Grid
Lark North Grid
LARK 1
BOK
Bok Grid
ZEL
68°00'N
BAK
CAN
Can Central Grid
COPE 4
LARK 2
Snorkel Grid
RICH
Rich Grid
JOE

FIGURE 8-12: Properties held by Ida Point Minerals, Lynx Canada Explorations and Noranda Exploration (76 O/15, 16; 77A/3). 1982/1983 grids are shown.

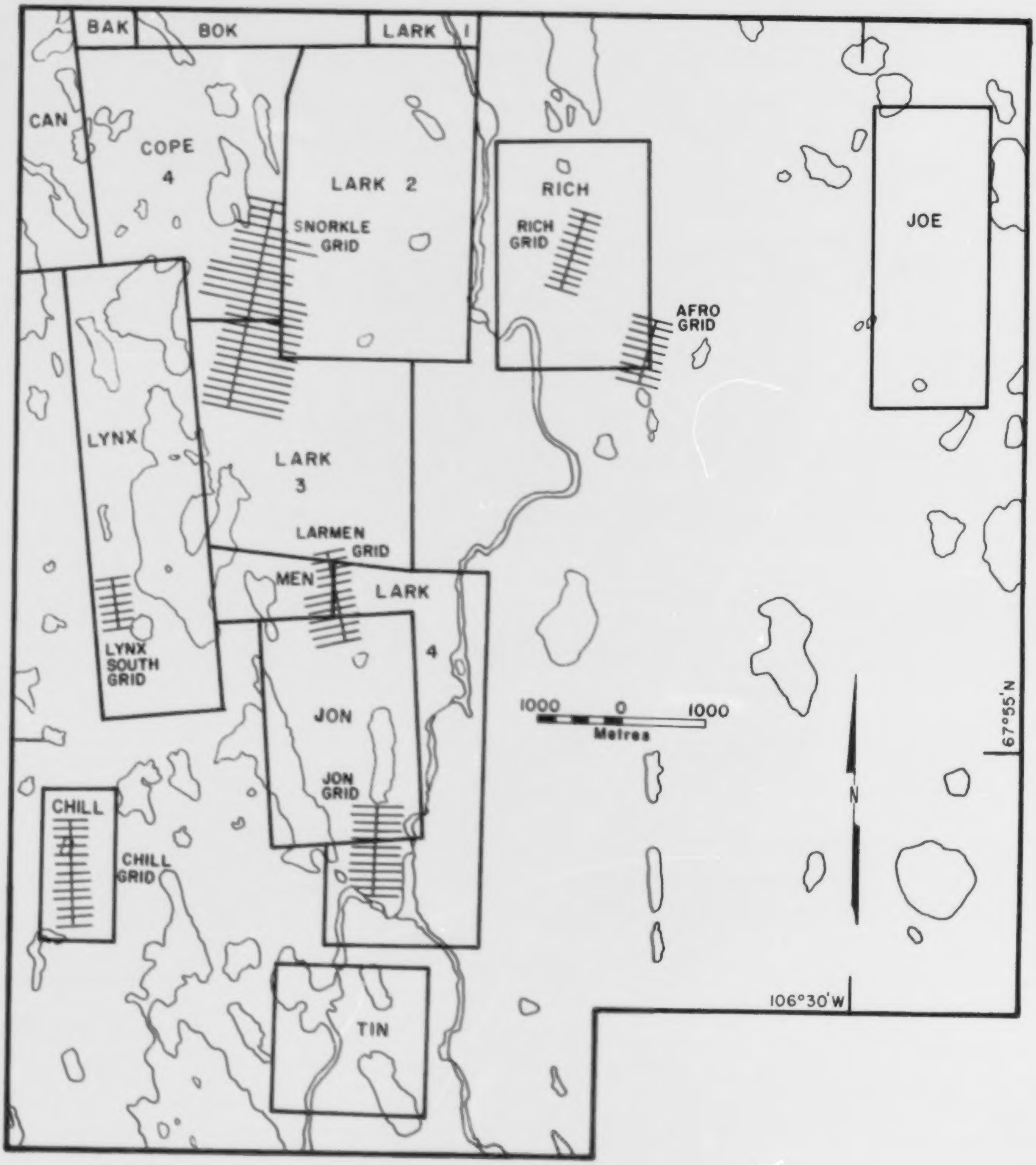
LOCATION

The exploration area (Fig. 8-11) is centred roughly 700 km north-northeasterly of Yellowknife and 130 km south-southeasterly of Cambridge Bay. Coordinates of individual claim centres are given in Table 8-2.

HISTORY

The Hope Bay Greenstone Belt was outlined during a 1962 reconnaissance survey (Fraser, 1964). The history of exploration and mining in the Hope Bay Greenstone Belt has been summarized by Thorpe (1972), who covers the period between 1966 and 1968, and by Padgham and others (1976), Gibbins and others (1977) and Seaton (1984).

Work has included small-scale mining and underground exploration of the Ida Point gold showing



BAK
BOK
LARK 1
CAN
COPE 4
LARK 2
SNORKLE GRID
RICH
RICH GRID
AFRO GRID
JOE
LYNX
LARK 3
LARMEN GRID
MEN
LARK 4
LYNX SOUTH GRID
JON
JON GRID
CHILL
CHILL GRID
TIN
1000
0
1000
Metres
N
67°55'N
106°30'W

FIGURE 8-13: Properties held by Ida Point Minerals, Lynx Canada Explorations and Noranda Exploration (76 O/15, 16). 1982/1983 grids are shown.

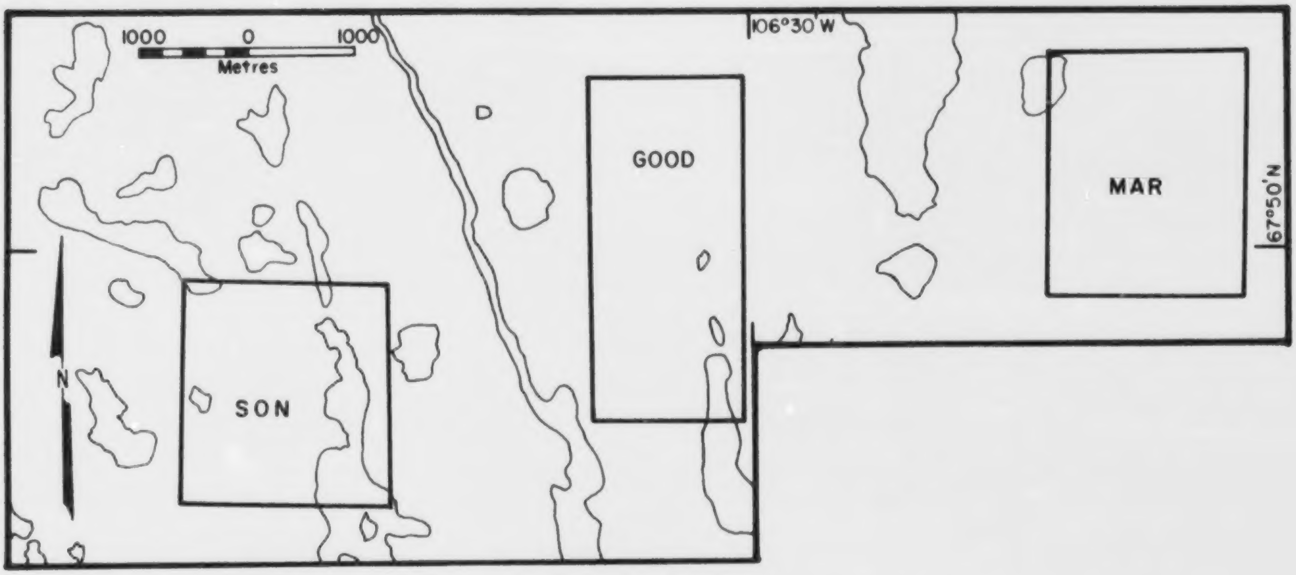


FIGURE 8-14: SON, GOOD and MAR claims (76 O/15,16). Properties held by Ida Point Minerals and Lynx Canada Explorations.

TABLE 8-2: SUMMARY OF DETAILED EXPLORATION ON LYNX/IDA CLAIMS IN 1982 (from tabulated summary by Noranda Exploration Co. Ltd.)

Claim	Lat. N	Long. W	Gridded	H.E.M.	Mag	Detailed Grid Geology	Prospected
BOK *	68°00'	106°40'	X	X	X	X	X
CAN *	67°59'	106°44.5'	X	X	X	X	X
LYNX *	67°51.5'	106°42.5'	X	X	X	X	X
MEN *	67°56'	106°40'	X	X	X	X	X
JON *	67°55'	106°39'	X	X	X	X	X
RICH	67°58'	106°34.5'	X	X	X	X	X
ADA	68°03.5'	106°34'					X
EVE	68°03.5'	106°37'					X
NEL	68°03.5'	106°47'					X
GOOD	67°50.5'	106°31'					X
BAK *	68°00'	106°43'					X

* Claims explored by Noranda Exploration Co. Ltd. All claims staked in summer of 1981

and of the silver deposit at a lake unofficially known as Roberts Lake. Companies and organizations which have been active in the area include Roberts Bay Mining Company Ltd., the Hope Bay Syndicate, Hope Bay Mines Ltd. (a subsidiary of New Hope Bay Mines Ltd.), Lynx Canada Explorations Ltd., Duncan R. Derry Ltd., and Derry, Michener and Booth. Several assessment reports that are listed by Caine and others (1981) give details of this work.

In 1977, Noranda Exploration Co. Ltd. carried out 1:31,680 reconnaissance mapping of the Hope Bay Greenstone Belt. They explored the Belt in early 1981 by a combined airborne EM (Input) and magnetometer survey, and during the summer of 1981 were involved in a staking rush in the area in competition with Lynx Canada Explorations Ltd. and Ida Point

Minerals. In the course of this staking rush, Noranda staked 800 claims and Lynx Canada, 603.

DESCRIPTION

The Hope Bay Greenstone Belt (Fig. 8-11) is composed mainly of Yellowknife Supergroup metavolcanics, including mafic, intermediate and felsic lavas, tuffs and agglomerates. Minor units of metasediments, usually black and sulphide-bearing mudstones, are found within mainly volcanic sequences.

North-northwesterly trending and westerly dipping foliation is general throughout the Hope Bay Greenstone Belt. Locally interflow sediments have a near-horizontal dip.

Easterly trending, steeply dipping to vertical

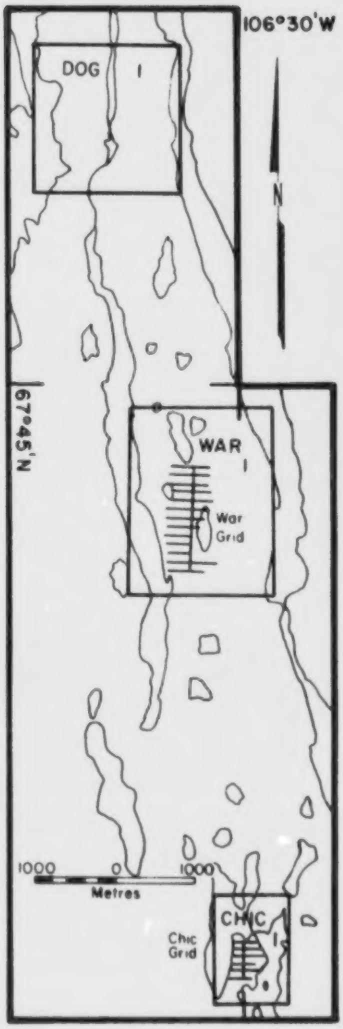

106°30'W
DOG 1
N
67°45'N
WAR 1
War Grid
1000 0 1000
Metres
CHIC 1
Chic Grid

FIGURE 8-15: DOG, WAR and CHIC claims and 1982/1983 grids (76 O/9, 10, 15). Properties held by Noranda Exploration.

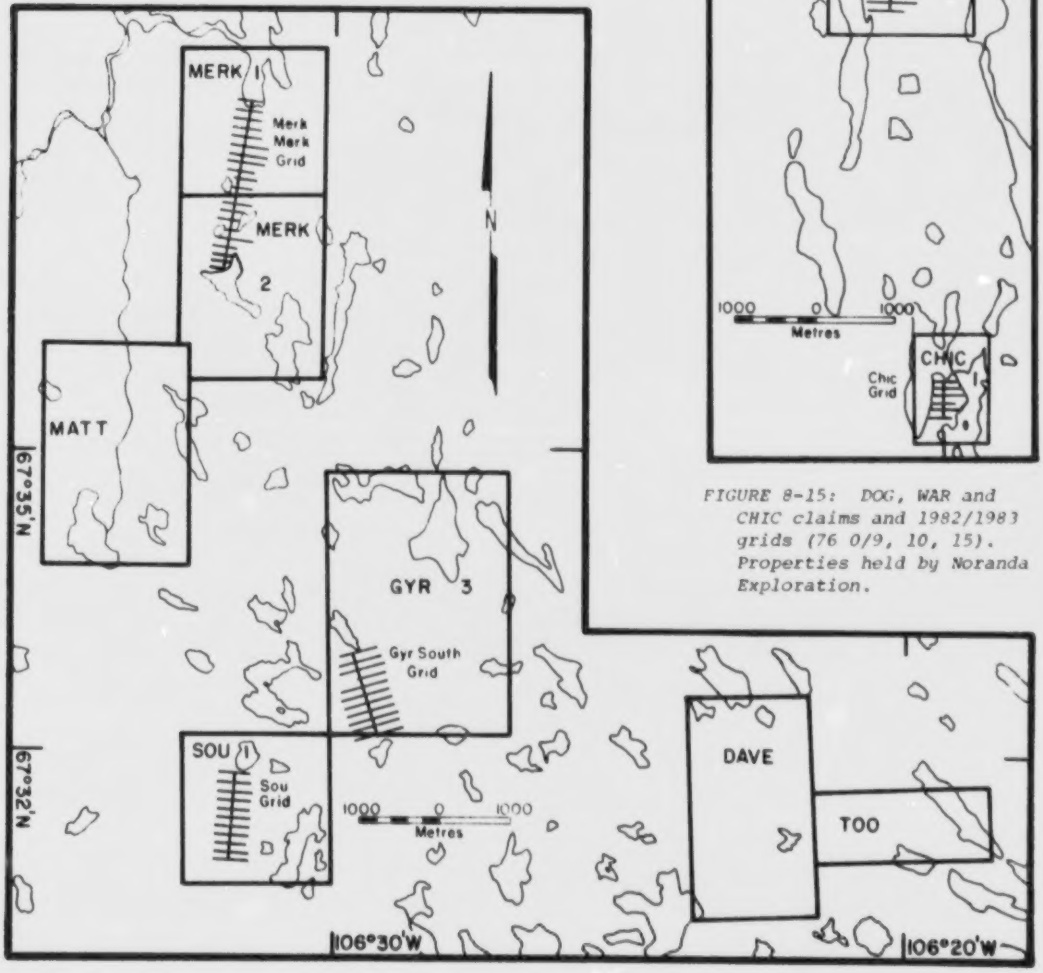

MERK 1
Merk Merk Grid
MERK 2
N
MATT
67°35'N
GYR 3
Gyr South Grid
SOU 1
Sou Grid
1000 0 1000
Metres
67°32'N
DAVE
TOO
106°30'W
106°20'W

FIGURE 8-16: MERK, MATT, GYR, SOU, DAVE and TOO claims and 1982/1983 grids (76 O/9,10). Properties held by Ida Point Minerals and Noranda Exploration.

fractures locally contain silver, as at Roberts Lake.

CURRENT WORK AND RESULTS

In 1982, ten grids were established to explore anomalies found by the airborne EM survey (Figs. 8-12, 8-13). These were: the Wolf Grid West Extension in the northwestern corner of the BOK claim; the Bok Grid in the southwestern part of the BOK claim; the Lark 1 North Grid at the northeastern corner of the BOK claim and extending onto the adjoining COPE 1, DOK 1 and LARK 1 claims; the Can North Grid, near the northwestern corner of the CAN claim; the Can Central Grid in the west-central part of the CAN claim; the Lynx South Grid in the southwestern part of the LYNX claim; the Larmen Grid covering part of the eastern margin of the MEN claim, the northern margin of the JON claim and the northwestern corner of the LARK 4 claim; the Jon Grid near the southeastern corner of the JON claim and extending across the southern margin of the JON claim onto LARK 4; the Rich Grid in the central part of the RICH claim; and, the Afro Grid at the southeastern corner of the RICH claim.

In 1982, six grids were surveyed by geological mapping, magnetometer and horizontal loop EM surveys and all ten were prospected.

In 1983, additional magnetometer and horizontal loop EM surveys were conducted on the Bok Grid, the Can North Grid, the Can Central Grid and the Lynx South Grid. Gravity surveys were done on the Can North Grid, the Can Central Grid and the Larmen Grid.

During 1983, a total of 194 m of diamond drilling was completed in three holes in search of massive sulphides. Two of the holes were on the Can Central Grid and one was on the Lynx South Grid. In one hole on the Can Central Grid and one on the Lynx South Grid, low (less than 0.5%) zinc concentrations and much lower concentrations of copper were cut over core lengths of one to several metres.

The 1982 and 1983 work was effected from a base camp at Windy Lake. The approximate coordinates of the camp were 68°04'N, 106°37'W.

TABLE 8-3: HOPE BAY PROJECT (NORANDA CLAIMS) EXPLORATION 1981 - 1983

Claim	Grid	NTS	1981	1982	1983
CHIC	Chic	76 O/9,10		Geol., Mag., HEM	
CHILL	Chill	76 O/15		Geol., Mag., HEM	Tr., DD (1)
COPE 1	Wolf	77 A/3	Mag., HEM., VLEM., PEM., DD (5)		
DOG		76 O/15			DD (1)
GYR 3	Gyr South	76 O/9		Geol., Mag., HEM	
LARK 1-4	Lark 1 South (LARK 1)	76 O/15	Geol., Mag., HEM	Geol., Mag., HEM	Mag., HEM., Grav.
	Snorkel (LARK 3,4; COPE 4)	76 O/15	Mag., HEM	Geol., Mag., HEM	HEM
	Lark 1 North (LARK 1)	76 O/15		Geol., Mag., HEM	DD (1) (LARK 2)
MERK 1,2	Merk merk	76 O/10		Geol., Mag., HEM	Mag., HEM., Grav., DD (2)
SOU	Sou	76 O/10		Geol., Mag., HEM	DD (1)
WAR	War	76 O/9, 10 (claim) 76 O/9 (grid)		Geol., Mag., HEM	

ABBREVIATIONS:

DD (4), diamond drilling with number of holes. Tr, trenching.

Geol., geological mapping. Mag., Magnetometer. VLEM, vertical loop EM.

HEM, horizontal loop EM. PEM, pulse EM.

HOPE BAY PROJECT
(NORANDA EXPLORATION CO. LTD. CLAIMS)

Noranda Exploration Co. Ltd.
4 - 2130 Notre Dame Ave.
Winnipeg, Man., R3H 0K1

Gold, Silver,
Base metals
76 O/9,10,15,16;
77 A/3
67°45'N, 106°30'W

REFERENCES

Fraser (1964); Gibbins and others (1977); Padgham and others (1976); Seaton (1984); Thorpe (1972).

DIAND assessment report 081732 and several earlier assessment reports (Caine and others, 1981).

PROPERTY

CHIC; CHILL; COPE 1,2,4; DOG; GYR; LARK 1-4; MERK 1,2; SOU; WAR.

LOCATION

The exploration area (Figs. 8-11 to 8-13, 8-15, 8-16) is centred roughly 700 km north-northeasterly of Yellowknife and 130 km south-southeasterly of Cambridge Bay. Coordinates of individual claim centres are given in Table 8-3.

HISTORY

The Hope Bay Greenstone Belt was outlined by a 1962 reconnaissance survey (Fraser, 1964). The history of exploration and mining in the Hope Bay Greenstone Belt is summarized under Hope Bay Project-Lynx Canada Explorations Ltd. claims (p.310 of this report).

DESCRIPTION

The Hope Bay Greenstone Belt is composed mainly of Yellowknife Supergroup metavolcanics, including mafic, intermediate and felsic lavas, tuffs and agglomerates. Minor units of metasediments, usually black, sulphide-bearing mudstones, are found within mainly volcanic sequences.

North-northwesterly trending and westerly dipping foliation is general throughout the Hope Bay Greenstone Belt. Locally interflow sediments have a near-horizontal dip.

Easterly trending steeply dipping to vertical fractures locally contain silver, as at Roberts Lake.

CURRENT WORK AND RESULTS

Ground follow-up of the 1981 airborne EM (Input) anomalies, initiated in 1981, continued in 1982 and 1983 as shown in Table 8-3.

Conductors tested by drilling were explained by the presence of graphite, pyrite or pyrrhotite. Low zinc concentrations (less than 0.2%) were cut over core lengths of 22 m and 15 m on the CHILL claim.

HIGH LAKE AND ANIALIK RIVER SUPRACRUSTAL BELTS

The High Lake Supracrustal Belt (Easton and others, 1982) is part of a northerly trending complex of mainly volcanic rocks, intruded to the west by extensive granitic plutons and flanked to the east by volcaniclastic, carbonate and turbidite sediments (Fig. 8-17).

The Anialik River Greenstone Belt (Easton, 1982; Tirrul and Bell, 1980; and Jackson and others, in press) is at the northern margin of the Slave Province. Tirrul and Bell describe the belt as comprising "a thick succession of Archean pillow basalts and andesites with significant but restricted accumulations of dacitic to rhyolitic volcanic rocks". The Anialik River Greenstone Belt has been referred to by Seaton (1978) as the Run Lake belt. Run Lake is the unofficial name of a lake at Cominco's RUN claim group.

An "isthmus" of metavolcanics, less than 5 km wide, links the Anialik and High Lake belts.

The KLC, FOG, SNO claims described in this section lie in the High Lake Belt while the DOE and RUN, XVM, FAST claims lie close to the northeastern margin of the Anialik River Belt.

Work not described in this section is listed in Table 8-1.

BO CLAIMS

Kidd Creek Mines Ltd.
P.O. Box 175, Suite 5000
Commerce Court West
Toronto, Ont., M5L 1E7

Copper, Lead,
Zinc, Silver
76 L/4
66°08'N, 111°37'W

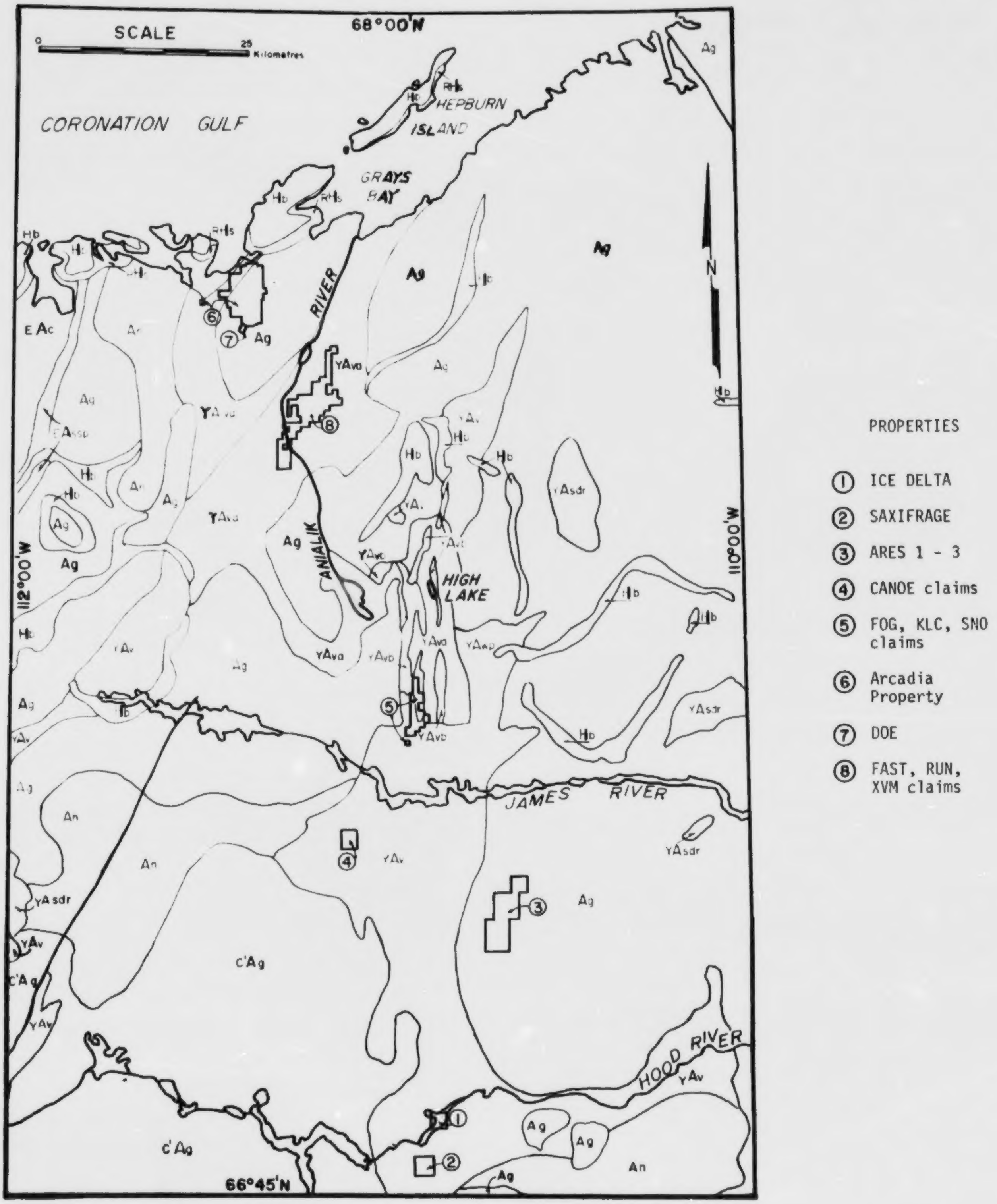
REFERENCES

Fraser (1964); Gibbins and others (1977); Seaton (1978; 1983a); Seaton and Hurdle (1978).

DIAND assessment reports 081604, 080884, 061408, 061345.

PROPERTY

BO 47-51, 69-79, 97-103, 116-119, 125-129.



SCALE
0
25
Kilometres
68°00'N
CORONATION GULF
HEPBURN
ISLAND
GRAYS
BAY
RIVER
ANIALIK
HIGH
LAKE
JAMES RIVER
HOOD RIVER
112°00'W
110°00'W
66°45'N
N
Ag
An
Hb
RHs
EAc
EAssp
YAva
YAvb
YAv
YAvp
YAsdr
C'Ag
PROPERTIES
① ICE DELTA
② SAXIFRAGE
③ ARES 1 - 3
④ CANOE claims
⑤ FOG, KLC, SNO claims
⑥ Arcadia Property
⑦ DOE
⑧ FAST, RUN, XVM claims

FIGURE 8-17: Regional geology and properties in the High Lake and Anialik River Supracrustal Belts. Geology after McGlynn (1977)

LEGEND FOR FIGURE 8-17

PROTEROZOIC

Hb	Gabbro sills and sheets. Includes Coronation and Franklin intrusions
RHs	Rae Group: sediments, undivided

EPWORTH GROUP

EAc	Rocknest Fm: dolomite
EAssp	Odjick Fm: sandstone, shale, mudstone

ARCHEAN

CAn CAg	Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup
Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
Ab	Gabbro, anorthosite, diorite and minor ultramafic rocks

YELLOWKNIFE SUPERGROUP

YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAwp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
YAva	Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks
YAvb	Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks
YAv	Volcanic rocks, undivided

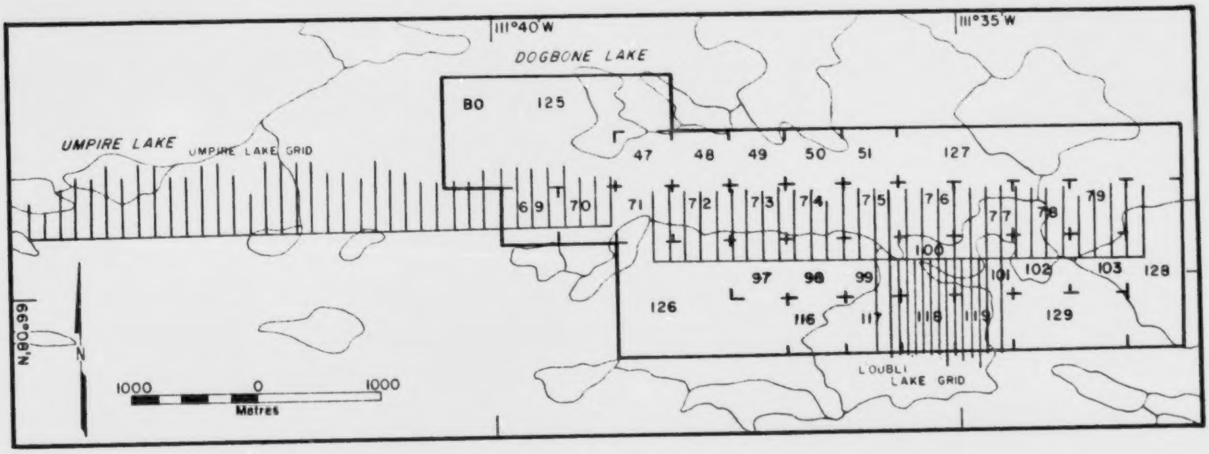


FIGURE 8-18: Grids on and near the BO claims.

LOCATION

The claims are 430 km north-northeasterly of Yellowknife in the southwestern segment of the High Lake Supracrustal Belt (Fig. 8-22, 8-18).

HISTORY

The history of the claims is summarized in Table 8-4.

In January of 1981, Target Exploration Services Ltd. acquired a majority interest in the BO claims from Long Lac Minerals. The claims were then optioned to Texas Gulf Incorporated, now Kidd Creek Mines Ltd. Some of the original BO claims that lapsed in 1979 were re-recorded as BO 125-129 in December of 1981.

DESCRIPTION

The regional geology is shown in Figure 8-22. The geology has also been compiled by Fraser (1964) at 1:506,880.

CURRENT WORK AND RESULTS

The 1982 exploration of the BO claims comprised

TABLE 8-4: HISTORY OF THE BO CLAIMS

YEAR	COMPANY, CLAIM	WORK DONE	ASSESSMENT REPORT; REFERENCE
1968 to 1970	Borealis Expl. Ltd., Prospecting Permit 60.	Reconn. geol., airborne geophysics.	Gibbins and others, 1977; Seaton and Hurdle, 1978.
1974	Long Lac Min. Expl., Prospecting Permit 336.	Reconn. geol., sampling, detailed gossan mapping, soil geochemistry.	061345; Gibbins and others, 1977.
1975	Long Lac Min. Expl., Prospecting Permit 336.	Airborne and ground geoph., geochemistry, geology.	061408; Seaton, 1978.
1976	Long Lac Min. Expl., BO 1-120.	Recorded in October.	080884; Seaton, 1983a.
1978	Noranda Expl. Co. Ltd., BO 1-120.	Optioned from Long Lac, reconn. and detailed geophysics.	080884; Seaton, 1983a.

geological mapping, VLF-EM, horizontal loop EM, magnetometer and gravity surveys. Two grids were set up on the claims; the Umpire Lake and the L'Oubli Lake grids (Fig. 8-18).

Geological mapping was compiled at 1:31,680 and 1:4,000 for the L'Oubli Lake and Umpire Lake grids respectively. There is little outcrop exposed on the BO claims. They appear to be underlain predominantly by intermediate to felsic volcaniclastic rocks. To the north and south of the claims are massive mafic volcanics. No new showings were discovered. A previously discovered showing, the Dogbone Lake showing, was re-examined and proved to be in situ frost heave. It is believed to be part of a small sulphide lens.

The geophysical surveys outlined numerous easterly striking conductors, most of which are believed to be caused by graphitic or graphitic-pyritic units.

FOG, KLC, SNO CLAIMS

Cominco Ltd.	Base metals
700 - 409 Granville St.	76 M/7
Vancouver, B.C., V6C 1T2	67°18'N,110°53'30"W

REFERENCES

Padgham and others (1974); Seaton (1978).

DIAND assessment reports 081529, 080187.

PROPERTY

FOG 11,18-22,24; 25 KLC claims; SNO 23.

LOCATION

The claims (Fig. 8-17) are 565 km north-northwesterly of Yellowknife.

HISTORY

The KLC claims, with the exception of KLC 1000, were recorded in June, 1974. KLC 1000 was recorded in July, 1982. Both the FOG claims and SNO 23 were recorded in September, 1974.

Preliminary mapping of the property in July and August of 1974 was followed in 1975 by both airborne and ground EM and magnetometer surveys, and by a soil and rock chip sampling survey and detailed geological mapping (DIAND assessment report 080187; Seaton, 1978).

DESCRIPTION

The regional geology of the area is shown in Figure 8-17. The claims are, in general, underlain by Archean metasediments and metavolcanics. A more detailed map of the geology has been made by Padgham and others (1974) at 1:31,680 and by Cominco in 1975 (DIAND assessment report 080187) at 1:10,000.

CURRENT WORK AND RESULTS

Soil sampling was carried out on two grids over the central part of the property (Fig. 8-19) in June of 1982. A total of 287 samples taken, mainly from frost boils, were analyzed for copper and zinc. Results indicated several scattered anomalies thought to be associated with pyritic cherty tuffite units.

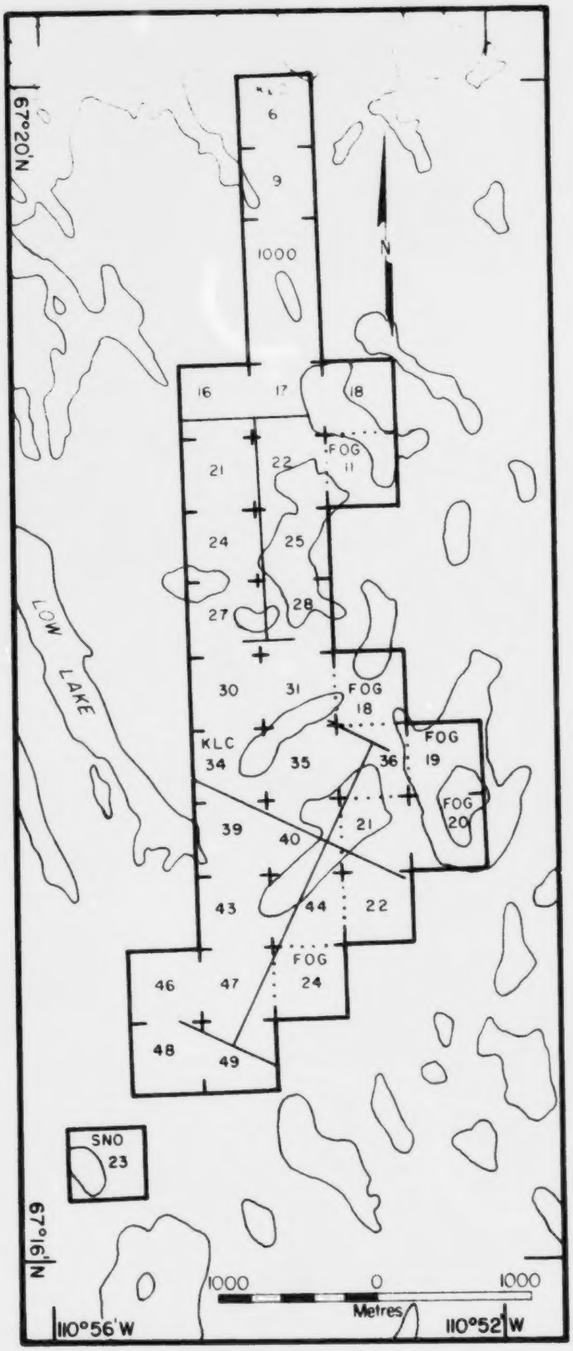


FIGURE 8-19: The FOG, KLC and SNO claims and grids.

DOE CLAIM

Canuc Resources Inc.
26 St. Joseph Street
Toronto, Ont., M4Y 1K1

Gold, Silver,
Base metals
76 M/11
67°40'30"N,111°21'30"W

REFERENCES

Gibbins and others (1977); Jackson and others (in press); Padgham and others (1976); Seaton (1984); Tirrul and Bell (1980).

DIAND assessment report 081679.

PROPERTY

DOE 1

LOCATION

The claim is 600 km north-northwesterly of Yellowknife and 10 km southwesterly of Grays Bay in the Coronation Gulf (Fig. 8-17).

HISTORY

The DOE 1 claim was recorded in August of 1981 and lies southerly of and adjacent to the Arcadia property, the history of which has been summarized by Seaton (1984), Gibbins and others (1977) and Padgham and others (1976). Numerous large gold-bearing quartz veins have been discovered on the Arcadia property, the most notable being the Sidewalk, North, and No. 1 veins.

DESCRIPTION

The regional geology of the area is shown in Figure 8-17. More recent maps are by Tirrul and Bell (1980) at 1:50,000, and by Jackson and others (in press) at 1:18,520. The DOE 1 claim and Arcadia property are marginal to a branch of the Anialik River Supracrustal Belt.

CURRENT WORK AND RESULTS

The work was done in the summer of 1983 by Watts, Griffis and McOuat Ltd., as consultants to Canuc Resources Inc.

A VLF-EM survey with readings at 30-m intervals was carried out over the claim, but did not detect conductors suggestive of sulphide-enriched gold-bearing quartz veins or sulphide deposits.

Preliminary geological mapping and sampling was also undertaken. The claim is predominantly underlain by a granodioritic stock. Seven samples from a northeasterly striking quartz vein were taken and analyzed for gold and silver. No significant values were reported.

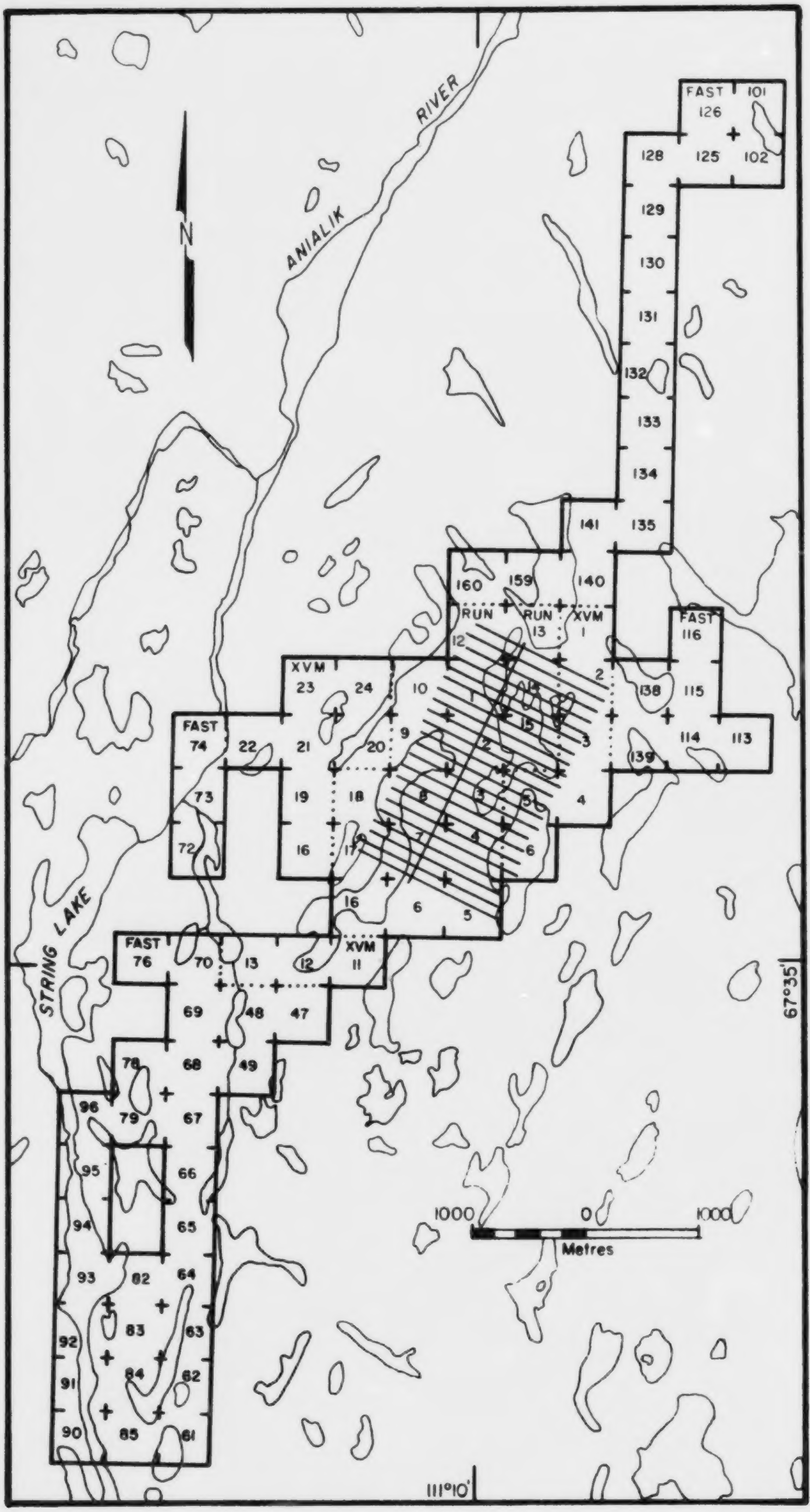

N
ANIALIK RIVER
STRING LAKE
FAST
RUN
XVM
1000
0
1000
Metres
67°35'
111°10'

FIGURE 8-20: The FAST, RUN and XVM claims and geophysics grid.

FAST, RUN, XVM CLAIMS

Cominco Ltd.	Copper,Silver
700 - 409 Granville St.	76 M/11
Vancouver, B.C., V6C 1T2	67°36'N,111°11'W

REFERENCES

Jackson and others (in press); Seaton (1978); Seaton and Hurdle (1978); Tirrul and Bell (1980).

DIAND assessment report 081672.

PROPERTY

52 FAST claims.
RUN 1-10,12-18.
XVM 1-6,11-13,16,19-24.

LOCATION

The claims are 595 km north-northeasterly of Yellowknife to the east of the Anialik River (Fig. 8-17).

HISTORY

The RUN and XVM claims were recorded in September, 1974. The FAST claims were recorded in January of 1975. Also in 1975 airborne and ground geophysics, geological mapping and diamond drilling were carried out over the claims (Seaton, 1978; Seaton and Hurdle, 1978).

DESCRIPTION

The regional geology is shown in Figure 8-17. More recent work has been done by Tirrul and Bell (1980) at 1:50,000 and by Jackson and others (in press) at 1:18,520. In general, the southwestern part of the claims are underlain by mafic to intermediate volcanics; the eastern and central parts fragmental felsic volcanics and minor conglomerate and sandstone.

CURRENT WORK AND RESULTS

Work was undertaken on the RUN 1-10,12-15,17,18 and the XVM 2-6 claims in the spring of 1983. A UTEM electromagnetic survey was carried out over a grid of twenty-four lines, 1300 m long, at 50 m station intervals. Eight lines were surveyed at 25 m station intervals (Fig. 8-20). Three relatively shallow conductors were defined. The responses were poor to moderate, with no indications of better conductors at depth.

EOKUK INLIER

The Eokuk Inlier or Uplift (of Archean rocks) is flanked to east, west and south by Aphebian sediments and to the north by the waters of Coronation Gulf (Fig. 8-21). It is essentially composed of granitoid rocks, minor mafic intrusives and by gneissic granitoid rocks.

For properties explored see Table 8-1.

CENTRAL ("OLGA LAKE") VOLCANIC BELT AND LUPIN MINE AREA

The Central Volcanic Belt (Bostock, 1980) has been popularly known as the Olga Lake Belt for several years, the name deriving from the unofficial name of a lake centred at 65°27'30"N, 111°-50'00"W. Kidd Creek Mines (formerly Texasgulf Inc.) has maintained a base camp on the north shore of Olga Lake.

The Central Volcanic Belt (Fig. 8-22) is about 75 km long in a direct line from east to west, but measured along strike is much longer because it wraps around the Central Batholith, which indents the belt's southern margin.

A fault, which is on strike with the Norma Fault (Tremblay, 1976) of the Lupin Mine area (Figs. 8-22, 8-22a), trends northeasterly through much of the Central Volcanic Belt and passes through a point 10 km due north of Olga Lake.

The Lupin Mine area is largely underlain by metasediments of the Contwoyto Formation, which are intruded by the Contwoyto Batholith. The Contwoyto Formation metasediments of the Lupin Mine area are separated from the Central Volcanic Belt by a 3 km to 12 km wide belt of Itchen Formation metasediments.

The Gondor silver-zinc-copper deposit, which has been explored and diamond drilled by Kidd Creek Mines Ltd., is 9 km north-northeasterly of Olga Lake, in the central part of the Central Volcanic Belt.

Properties explored in 1982/1983 are listed below and in Table 8-1.

GONDOR, TAQ CLAIMS

Kidd Creek Mines Ltd.	Silver, Zinc, Copper
Box 175, Suite 5000	76 E/12
Commerce Court West	65°34'N, 111°49'W
Toronto, Ont., M5L 1E7	

REFERENCES

Bostock (1980); Craig and others (1960); Seaton (1981).

PROPERTIES

① NERAK
② NERAK 2-5
③ WEST 2
④ FILL
⑤ EAST 1
⑥ BARB
⑦ CLIFF
⑧ SEA
⑨ FIT 1,2
⑩ COAST
⑪ CHUK
⑫ HILL 1,2
⑬ CON 1-4
⑭ MIKE 1,2
⑮ GS 1-5
⑯ GREEN 1,2
⑰ KIK
⑱ FRAZ
⑲ WEST 1

As of Jan., 1985, properties 1-18 are owned by Westsun Petroleums and Minerals Ltd.; property 19 by G. Pin.

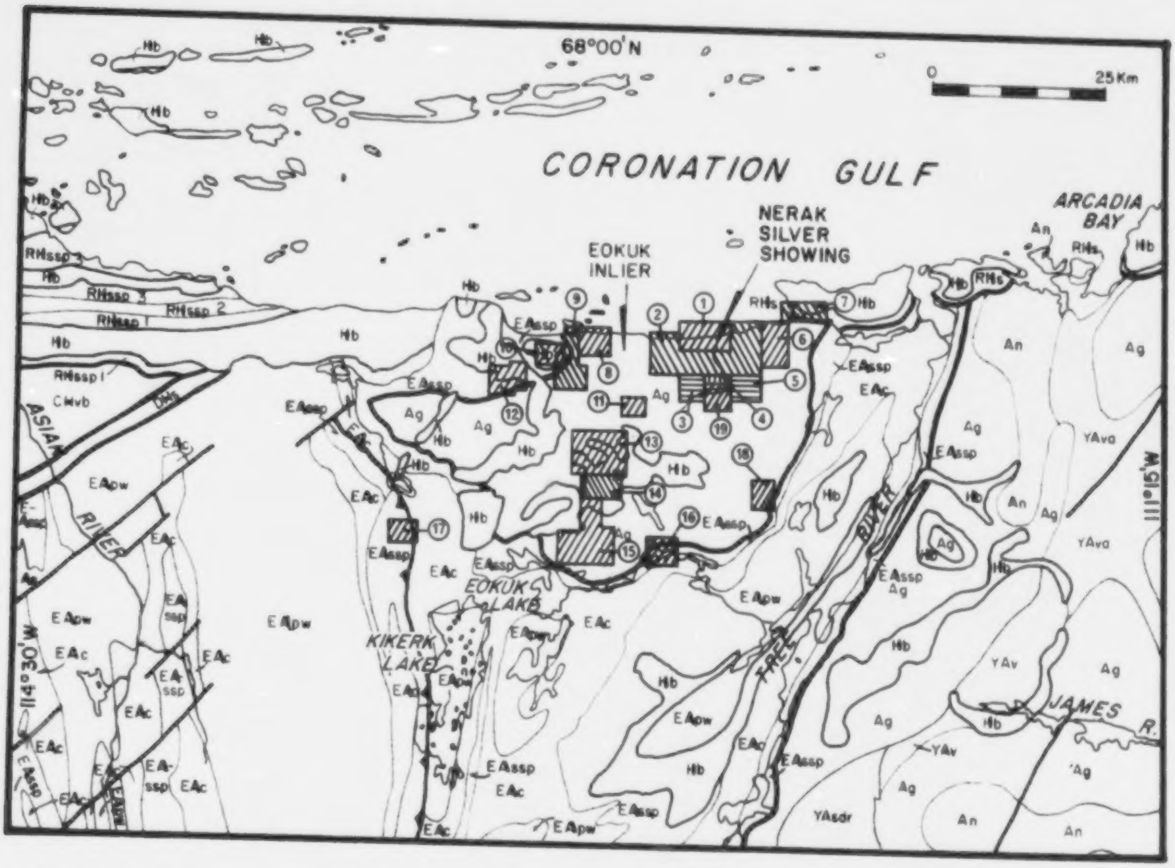

68°00'N
0
25 Km
CORONATION GULF
NERAK SILVER SHOWING
EOKUK INLIER
ARCADIA BAY
EOKUK LAKE
KIKERK LAKE
ASIAK RIVER
TREE RIVER
JAMES R.
114°30'W
111°15'W
Hb
RHssp 1
RHssp 2
RHssp 3
RHs
CHvb
EApw
EAc
EAssp
Ag
An
YAvo
YAv
YAsdr

FIGURE 8-21: Eokuk Inlier. Kikerk Lake, Eokuk Lake and Tree River areas. Regional geology and properties. Regional geology by McGlynn (1977).

PROTEROZOIC

Hb Gabbro sills and sheets. Includes Coronation and Franklin intrusions

RAE GROUP

RHssp3 Shaly sandstone, siltstone, shale

RHssp2 Red and green sandstone, mudstone

RHssp1 Sandstone, siltstone, shale

RHs Rae Group undivided

EPWORTH GROUP

EApw Rocknest Fm: dolomite

EAc Odjick Fm: sandstone, shale, mudstone

EAssp RECLUSE FORMATION: argillite, shale, greywacke turbidites

COPPERMINE RIVER GROUP

CHvb COPPER CREEK FORMATION: basaltic flows, minor sandstone

DISMAL LAKE GROUP

DHs Dismal Lake Group undivided

ARCHEAN

Ag Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided

An Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks

YELLOWKNIFE SUPERGROUP

YAsdr Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks

YAvo Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks

YAv Volcanic rocks, undivided

DIAND assessment report 081696, 081676.

PROPERTY

GONDOR 1-8; TAQ 1-9.

LOCATION

The property (Figs. 8-22, 8-23) is centred 370 km north-northeasterly of Yellowknife and 10 km north of "Olga Lake". Kidd Creek's base camp was on the north shore of Olga Lake. The TAQ claims extend roughly 10 km southwesterly, 4 km northerly and 6.5 km easterly of the Gondor silver-base metal deposit (65°33'43"N, 111°48'00"W). TAQ 1 and 3 claims enclose GONDOR 1 to 8, which are smaller than the TAQ claims because they were staked under earlier Canada Mining Regulations.

HISTORY

In March, 1977, Noranda Exploration Company Ltd. staked GONDOR 1-8 to cover anomalies detected by a 1976 airborne EM and magnetometer survey. Ground follow-up by Noranda is summarized by Seaton (1981).

Airborne EM and magnetometer surveys have been flown over the Central Volcanic Belt (Bostock, 1980) by Noranda, Texasgulf Inc. (Kidd Creek Mines Ltd. since November of 1981) and Cominco Ltd. All three companies outlined anomalies over the Gondor deposit in the centre of the GONDOR claims.

Noranda and, later, Texasgulf who optioned the GONDOR claims along with five other Noranda properties in the Central Volcanic Belt in March of 1981, did ground geophysics as a follow-up to the airborne survey. Kidd Creek Mines outlined a strong residual gravity anomaly over the Gondor deposit which is also marked by a conductor flanked by a magnetic anomaly. Massive sulphide boulders were found near the deposit during prospecting of the GONDOR claims. From 1981 through 1983, Kidd Creek Mines drilled the Gondor deposit.

TAQ 1-3 were recorded in June of 1981 - TAQ 2 to the north of TAQ 1 and 3. TAQ 7, which lies east of TAQ 3 was added to the claim group in July of 1981. TAQ 4-6 and TAQ 8 and 9 were recorded in July and November of 1981. The sequence of staking reflects the acquisition of ground mainly along strike from and successively farther away from the Gondor stratabound volcanogenic massive sulphide deposit.

By staking the TAQ claims, Kidd Creek Mines consolidated their claims around the GONDOR group into a single block of TAQ, TEN and TET claims. The TEN and TET claims are described and work done on them summarized by Seaton (1981).

DESCRIPTION

The claims are in the central part of the Central or "Olga Lake" Volcanic Belt (Fig. 8-22). Olga Lake is the unofficial name of a 5-km-long by 4-km-wide lake centred at 65°27'30"N, 111°50'00"W on the southern margin of the volcanic belt. The regional geology has been mapped by Bostock (1980) at 1:250,000 scale, and earlier, at a reconnaissance scale of 1:506,880, by Craig and others (1960).

The GONDOR-TAQ-TEN-TET claim block is underlain by mafic and felsic volcanics of amphibolite facies.

CURRENT WORK AND RESULTS

In 1982, a grid (Fig. 8-23) with a 7.25-km-long northeasterly baseline and covering parts of TAQ 1,2,4,5,6,8 and 9 was geologically mapped and explored by VLF-EM and Crone surface pulse (DEEP-EM). One conductor that is of apparent bedrock source, and that is evidently formational, was delineated. It was previously detected by airborne EM. The geological survey, which included a compilation of the geology of both the TAQ and GONDOR claims, showed the TAQ claims to be underlain by mafic flows, mafic tuffs, fragmentals (including agglomerates), felsic and intermediate tuffs (including rhyolitic tuffs), quartz porphyry and clastic metasediments. The Gondor deposit is enclosed in a unit of felsic to intermediate tuffs and is in a northeasterly plunging Z-shaped fold. Younging direction in the supracrustal rocks is uncertain. A fault zone strikes northeasterly, sub-parallel to and 300 m to 800 m to the northwest of the TAQ baseline. The fault zone can be traced for about 30 km northeasterly to Fingers Lake near Lupin Mine and to a point about 15 km southwesterly of the GONDOR claims.

Anomalously high concentrations of gold were found in one sample from a quartz vein which cuts quartz porphyry.

In 1983, ground survey-controlled air photography was completed over the Gondor massive sulphide deposit and surrounding area. Twenty-three targets were established and accurately surveyed. Samples of drill core from the Gondor massive sulphide deposit were subjected to metallurgical tests mainly to determine flotation characteristics.

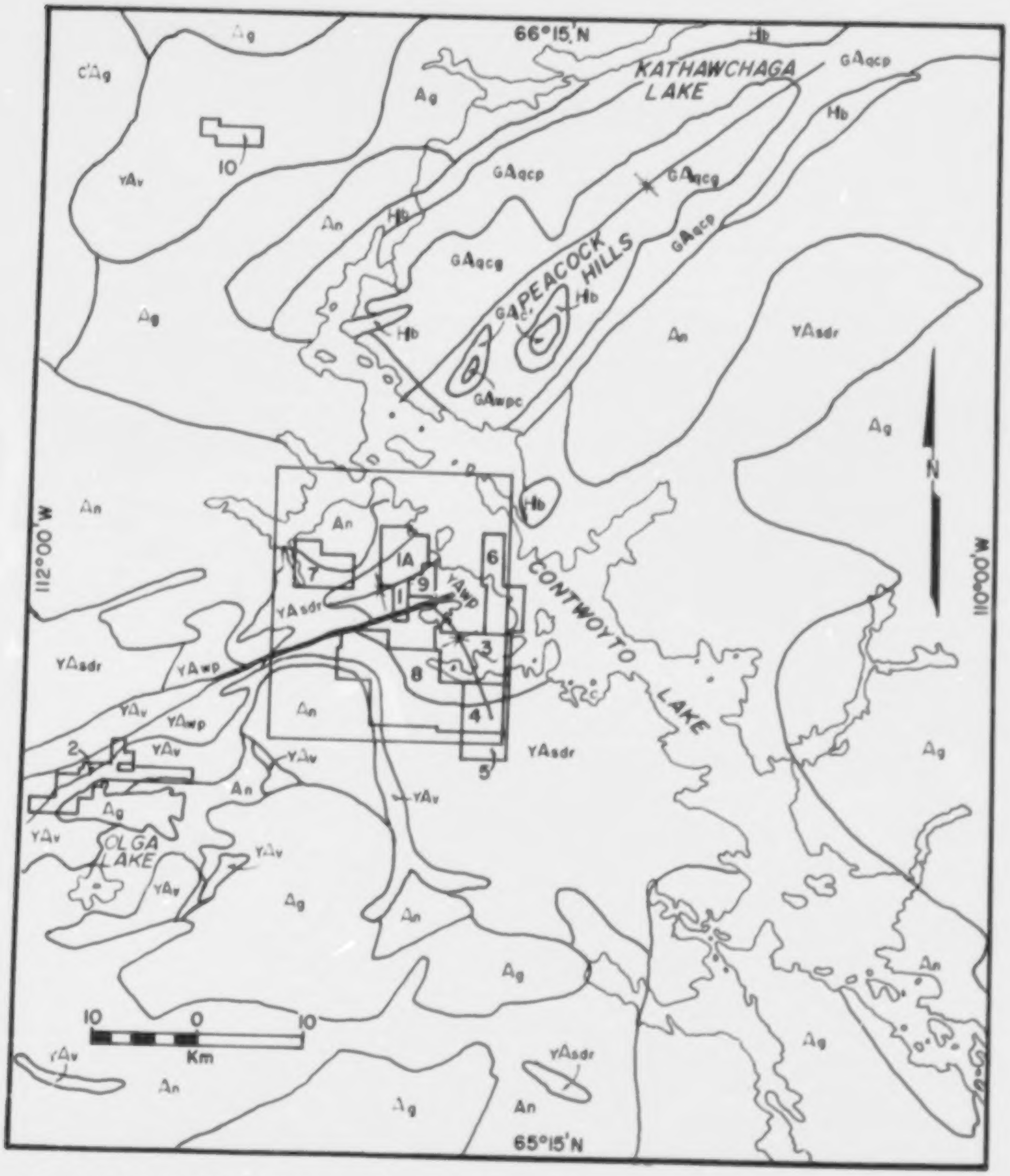

66°15'N
KATHAWCHAGA LAKE
PEACOCK HILLS
CONTWOYTO LAKE
OLGA LAKE
112°00'W
110°00'W
65°15'N
N
10
0
10
Km
Ag
CAg
YAv
An
Hb
GAqcp
GAqcg
GAwpc
YAsdr
YAwp
1
1A
2
3
4
5
6
7
8
9
10

FIGURE 8-22: Regional geology and properties in the Central (Olga Lake) Volcanic Belt, Lupin Mine area, and the southwestern segment of the High Lake Supracrustal Belt. Geology from McGlynn (1977). Legend and property list on adjoining page.

AU 10,13,16,27 CLAIMS

Hemisphere Development Corp.	Gold
710 - 475 Howe St.	76 E/10, 11
Vancouver, B.C., V6C 2B3	65°40'30"N,111°04'W

REFERENCES

Baragar and Hornbrook (1963); Bostock (1980); Schiller and Hornbrook (1964); Tremblay (1976). DIAND assessment reports 081739; 017167.

PROPERTY

AU 10,13,16,27.

LOCATION

The claims are 395 km northeasterly of Yellowknife, and include most of Shallow Bay on the west side of Contwoyto Lake (Figs. 8-22, 8-22a).

PROPERTIES

for Figures 8-22
and 8-22a

CENTRAL VOLCANIC BELT
AND LUPIN MINE AREA

① DER claims

(1A) Lupin Mine lease

② GONDOR, TAQ claims

③ AU 10, 13, 16, 27

④ AU 14, 17

⑤ AU 15

⑥ OP claims

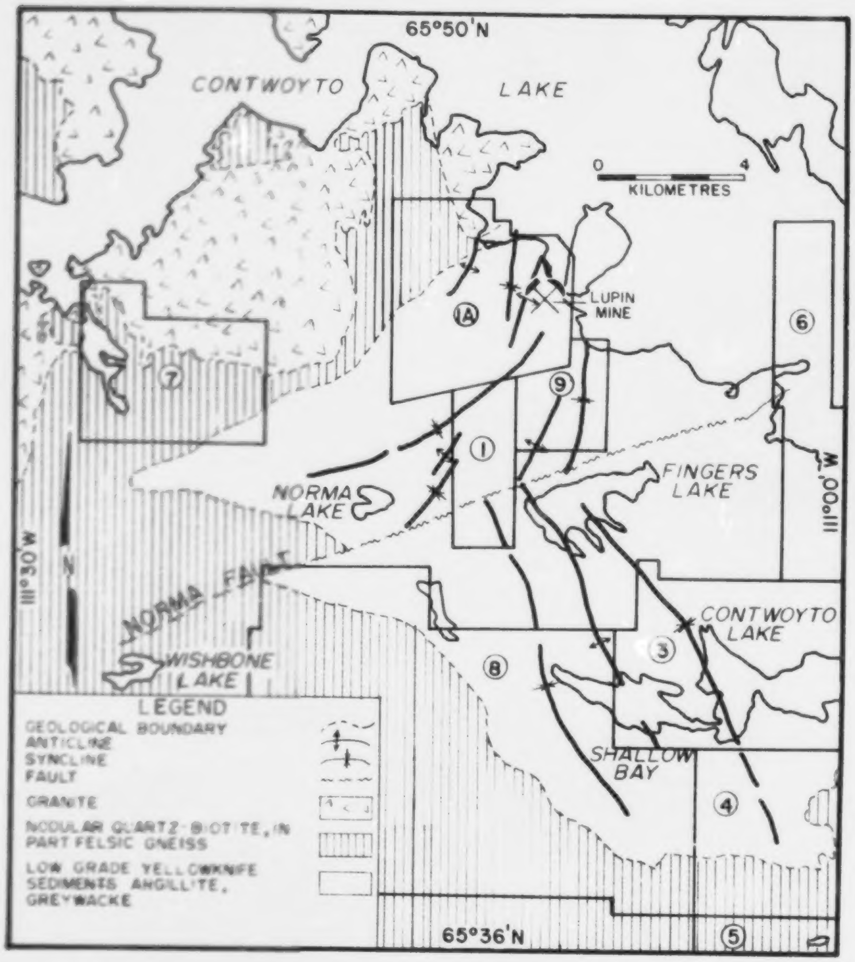
⑦ AU 2, 3

⑧ BARB, AU 4, 5, 7, 11,
KAP, MINER claims

⑨ FIN claims

SW SEGMENT OF HIGH
LAKE SUPRACRUSTAL BELT

⑩ BO claims



65°50'N
CONTWOYTO
LAKE
0
4
KILOMETRES
LUPIN
MINE
(1A)
⑥
⑦
⑨
①
NORMA
LAKE
FINGERS
LAKE
111°00'W
111°30'W
NORMA FAULT
CONTWOYTO
LAKE
③
WISHBONE
LAKE
⑧
SHALLOW
BAY
④
LEGEND
GEOLOGICAL BOUNDARY
ANTICLINE
SYNCLINE
FAULT
GRANITE
NODULAR QUARTZ-BIOTITE, IN PART FELSIC GNEISS
LOW GRADE YELLOWKNIFE SEDIMENTS ARGILLITE, GREYWACKE
65°36'N
⑤

FIGURE 8-22a: Inset of Lupin Mine area. Property numbers are the same as for Figure 8-22.

LEGEND FOR FIGURE 8-22

PROTEROZOIC

Hb	Gabbro sills and sheets. Includes Coronation and Franklin intrusions

GOULBURN GROUP

GAwpc	Peacock Hills Fm: mudstone, greywacke, turbidites, dolomite
GAc'	Kuuvik Fm: dolomite, stromatolitic dolomite
GAqcg	Burnside River Fm: subarkose, quartzite, quartz pebble conglomerate, mudstone, arenaceous dolomite
GAqcp	Western River Fm: quartzite, mudstone, siltstone, arenaceous and stromatolitic dolomite, quartz pebble conglomerate

ARCHEAN

Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks
C'An C'Ag	Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup

YELLOWKNIFE SUPERGROUP

YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAwp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
YAv	Volcanic rocks, undivided

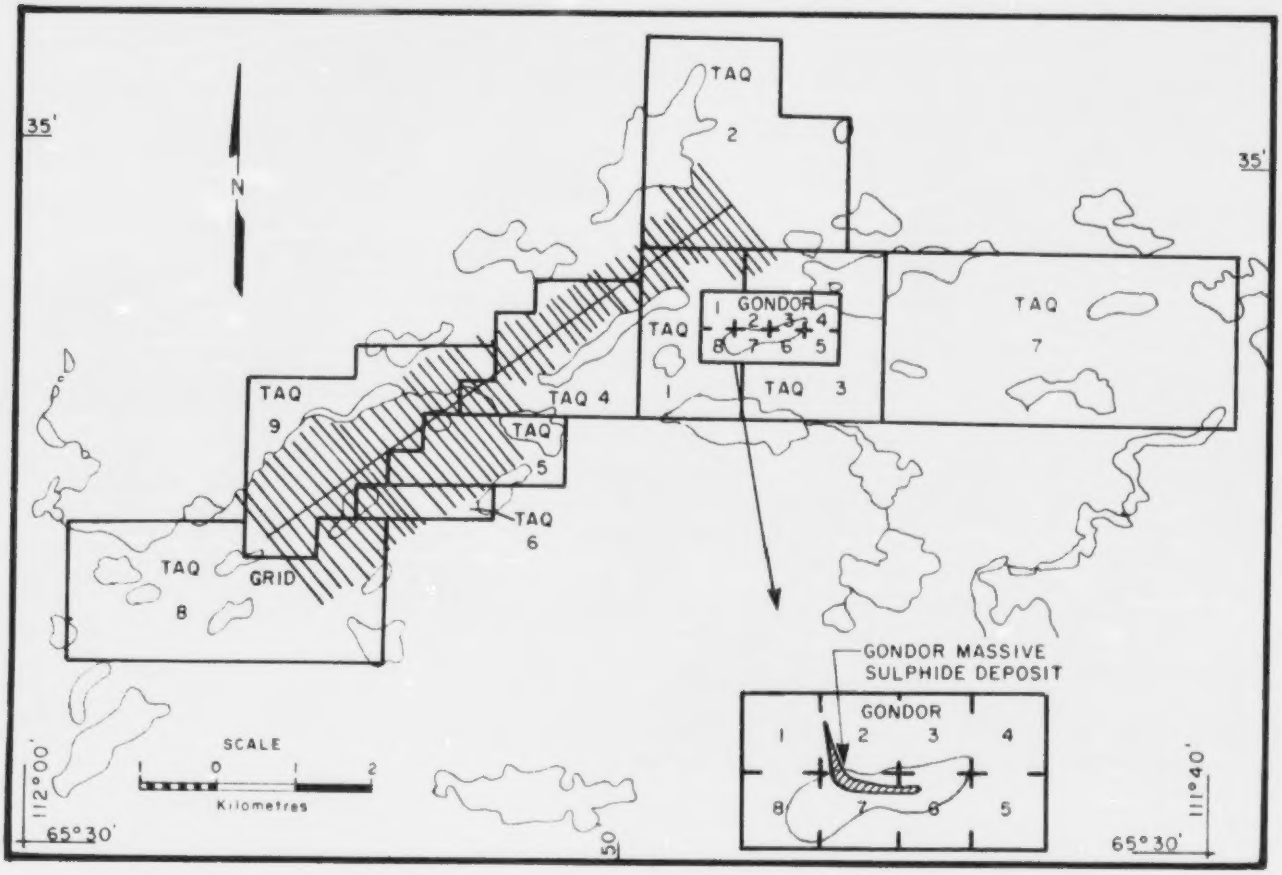

35'
N
TAQ
2
35'
GONDOR
1
2
3
4
8
7
6
5
TAQ
1
TAQ 3
TAQ
7
TAQ
9
TAQ 4
TAQ
5
TAQ
6
TAQ
8
GRID
GONDOR MASSIVE
SULPHIDE DEPOSIT
GONDOR
1
2
3
4
8
7
6
5
SCALE
1
0
1
2
Kilometres
112°00'
65°30'
50
111°40'
65°30'

FIGURE 8-23: GONDOR and TAQ claims. Claims, grid and Gondor massive sulphide deposit locations.

HISTORY

Gold was first discovered in the area in 1960 by the Canadian Nickel Company Ltd. In 1961, the BAY claim group was staked by the Earl-Jacks Syndicate and covered what is now AU 27 and AU 10. Also in 1961, Falconbridge Nickel Mines Ltd. optioned the BOX and FOX claims, among others, from Conwest Exploration Company Ltd. These claims covered part of the present AU 13 and AU 16 claims. The eastern half of the AU 16 claim was originally Prospecting Permit 76-E-10, granted to Canadian Nickel Company Ltd. in 1962 (DIAND assessment report 017167). By 1973, all had lapsed. Baragar and Hornbrook (1963), Schiller and Hornbrook (1964) and Tremblay (1976) cover the history and work done on these properties between 1962 and 1964.

The present claims were recorded in February, 1981. They were placed under option to Bow Valley Industries Ltd. in May, 1984.

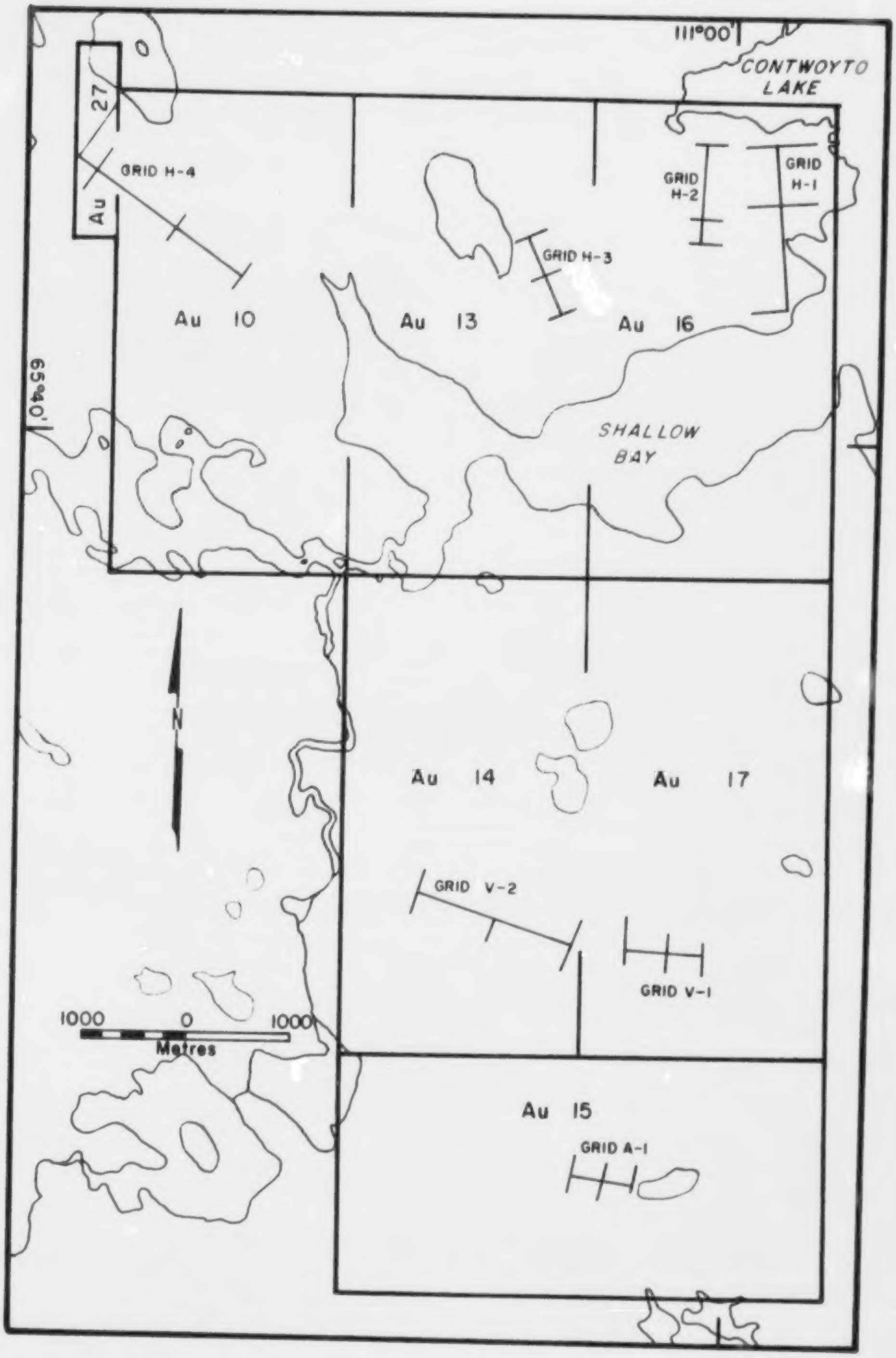
DESCRIPTION

Figures 8-22 and 8-22a show the regional geology of the area. Bostock (1980) and Tremblay (1976) have mapped the area at 1:250,000 and 1:50,000 respectively.

CURRENT WORK AND RESULTS

VLF-EM and magnetometer surveys were carried out over four grids (H-1 to H-4) in the 1983 field season. All grids except H-3 were geologically mapped at a scale of 1:2,000 (Fig. 8-24).

Numerous layers and lenses of iron formation were found interbedded with argillaceous greywackes. Associated with the iron formations are pyrite, pyrrhotite and arsenopyrite (grids H-2 and H-4). Grab



111°00'
CONTWOYTO LAKE
Au 27
GRID H-4
GRID H-2
GRID H-1
GRID H-3
Au 10
Au 13
Au 16
65°40'
SHALLOW BAY
N
Au 14
Au 17
GRID V-2
GRID V-1
1000
0
1000
Metres
Au 15
GRID A-1

FIGURE 8-24: The AU 10, 13, 16, 27; AU 14, 17; and AU 15 claims and grids.

samples of the iron formations assayed 0.3 g/tonne Au for grid H-1, 0.206 to 6.446 g/tonne Au for grid H-2, and 0.343 to 1.916 g/tonne for grid H-4.

The VLF-EM surveys revealed several weak to moderate conductors, some of which correspond to known iron formations; others appear to be extensions of iron formations.

Positive or negative magnetic anomalies were found to be caused by diabase dykes or iron formations. The magnetic lows were attributed to polarity reversal of magnetite or pyrrhotite.

AU 14,17 CLAIMS

Viscount Resources Ltd.	Gold
710 - 475 Howe St.	76 E/10, 11
Vancouver, B.C., V6C 2B3	65°38'N,111°01°W

REFERENCES

Bostock (1980); Schiller (1965); Tremblay (1976).
DIAND assessment reports 081737; 017167.

PROPERTY

AU 14,17.

LOCATION

The claims are 390 km northeasterly of Yellowknife, 3 km south of Shallow Bay on the west side of Contwoyto Lake (Figs. 8-22, 8-22a).

HISTORY

The AU 14,17 claims cover ground previously staked as part of the PEG 1-36 and JUDY 1-18 claims that were held by Giant Yellowknife Mines in 1962. In 1963, these claims lapsed.

In 1962, Permit Area 33 (later P.P. 76-E-10) was granted to Canadian Nickel Company Ltd. and covered what is now the eastern part of AU 17. Geological mapping and geophysics were carried out from 1962 to 1964, when the claims lapsed (DIAND assessment report 017167; Schiller, 1965).

The claims were recorded in February, 1981 and were placed under option to Bow Valley Industries Ltd. in May, 1984.

DESCRIPTION

The regional geology is shown in Figures 8-22 and 8-22a. The area around the claim has also been mapped by Tremblay (1976) at 1:50,000 and in part by Bostock (1980) at 1:250,000.

CURRENT WORK AND RESULTS

In the summer of 1983, two grids, V-1 and V-2, were set up on the claims (Fig. 8-24). Reconnaissance and detailed mapping and geophysical surveys were carried out over each grid.

Numerous iron formations interbedded with argillaceous metasediments were mapped, as well as the greenschist/amphibolite facies metamorphic isograd trending northeasterly across the AU 17 claim. Samples of the iron formations assayed less than 1 g/tonne Au.

VLF-EM and magnetic surveys were undertaken. The weak to moderate conductors detected by the VLF-EM survey are believed to be indicative of diabase dykes, as are the main positive magnetic anomalies. The iron formations showed varying magnetic responses and no anomalous response to the VLF-EM, thereby indicating that sulphide mineralization is discontinuous.

AU 15 CLAIM

Amhawk Resources Corp.	Gold
809 - 837 West Hastings St.	76 E/10, 11
Vancouver, B.C., V6C 1B6	65°36'N,111°01'W

REFERENCES

Bostock (1980); Tremblay (1976).
DIAND assessment report 081735.

PROPERTY

AU 15.

LOCATION

The claim is 390 km northeasterly of Yellowknife, south of Shallow Bay in the Contwoyto Lake area (Figs. 8-22, 8-22a).

HISTORY

Gold was first discovered in the area in 1960 by Canadian Nickel Company Limited. In 1961 a staking rush occurred and many claims were staked around the Canadian Nickel property by numerous companies. Roberts Mining Company Ltd. staked the DUD, FUZZ, FRY, MOR and HAR claims (a total of 99 claims) in the area of the present AU 15 claim.

Most of the work done on the claims was carried out in 1963 when prospecting, mapping, trenching and a magnetic survey were done. Gold assays averaging 3.4 to 5.1 g/tonne, with a maximum of 56.1 g/tonne Au were reported. By 1973 the claims had lapsed. A more detailed history of the claims and surrounding area is given by Tremblay (1976).

The AU 15 claim was recorded in February, 1981.

DESCRIPTION

The regional geology is shown in Figures 8-22 and 8-22a. The area has been mapped at 1:250,000 by Bostock (1980) and by Tremblay (1976) at 1:50,000.

CURRENT WORK AND RESULTS

In the summer of 1983, a grid (Grid A-1) was set up to cover the area where gold was reported in 1963 (Fig. 8-24). The grid area was geologically mapped at 1:2,000 and grab samples assayed for gold, but results were discouraging. Numerous iron formations were found in the grid area with varying grades of gold and sulphide mineralization.

VLF-EM and magnetometer surveys were also carried out over the grid. The magnetometer survey indicated that the iron formations were weakly to non-magnetic and were often indicated by magnetic lows. The VLF-EM survey did not reveal any significant conductors.

OP CLAIMS

O.P. Resources Ltd.	Gold
P.O. Box 2045	76 E/10,11,14,15
Yellowknife, N.W.T., X1A 2P5	65°44'N,111°00'W

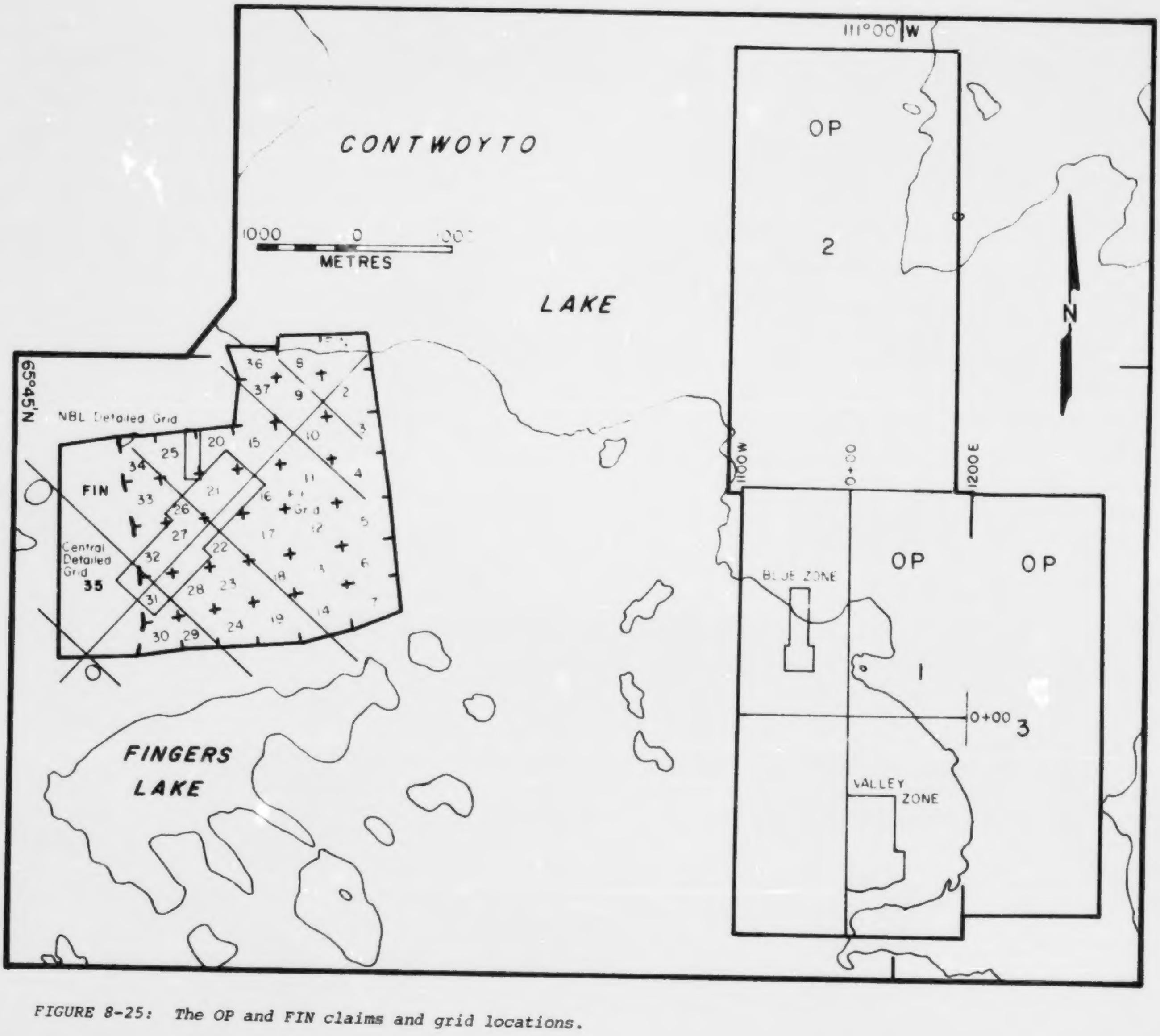

111°00'W
CONTWOYTO
LAKE
1000 0 1000
METRES
N
OP
2
65°45'N
NBL Detailed Grid
FIN
FIN Grid
Central Detailed Grid
36 8 37 9 2 3 10 25 20 15 34 4 11 33 21 16 26 5 12 27 17 32 22 6 35 13 28 23 18 31 7 14 30 29 24 19
1100W
0+00
1200E
BLUE ZONE
OP
1
OP
3
0+00
VALLEY ZONE
FINGERS
LAKE

FIGURE 8-25: *The OP and FIN claims and grid locations.*

REFERENCES

Baragar and Hornbrook (1963); Bostock (1980); Fraser (1964); Seaton (1984); Tremblay (1976).

DIAND assessment reports 081758, 017167, 017132.

PROPERTY

OP 1-3.

LOCATION

The claims are 400 km northeasterly of Yellowknife, and cover part of the southwestern shore of Contwoyto Lake (Figs. 8-22, 8-22a).

HISTORY

The OP claims cover an area originally staked as the BOX claims by Conwest Exploration Company Ltd. in 1961. These claims were subsequently optioned to Falconbridge Nickel Mines Ltd., who explored them between 1961 and 1963. Auriferous iron formation found in the central part of the claims was reported to have a maximum concentration of 5.5 g/t Au over 1.13 m (Seaton, 1984; Baragar and Hornbrook, 1963). The OP 2 and OP 3 claims partly cover lapsed Prospecting Permits 76-E-10 (P.P. 33) and 76-E-15 (P.P. 35) granted to Canadian Nickel Company Ltd. in 1962. These areas were explored from 1962 to 1964 (DIAND assessment reports 017162, 017167).

In January of 1980, the IGOR 1 claim was recorded by M. Magrum for Oxen Engineering Ltd. It was then transferred to O.P. Resources who changed the name to OP 1. The OP 2, 3 claims were recorded for O.P. Resources in July of 1983.

DESCRIPTION

The regional geology is shown in Figures 8-22 and 8-22a. The area is predominantly underlain by Archean metagreywacke with iron formation lenses. Geological maps by Tremblay (1976) and Bostock (1980) cover the western portion of the claims at 1:50,000 and 1:250,000 respectively. East of longitude 111°00W, the area has only been mapped at 1:506,880 scale by Fraser (1964).

CURRENT WORK AND RESULTS

The work conducted in 1983 was on the OP 1 claim. A grid was set up over the entire claim (Fig. 8-25) and geological mapping, prospecting and geophysics undertaken. Areas of interest were then tested by geological, magnetometer, VLF-EM, and self-potential (S.P.) surveys. Selected VLF conductors were surveyed with horizontal loop EM. Geophysical readings were taken at 25 and 12.5-m intervals along the lines of the main grid and at 10 and 5-m intervals on the detailed grids. Four zones were tested: the Main, West, Blue and Valley zones, most of which were explored in the 1960's by Falconbridge. The Main and West zones exhibit weak to moderate VLF conductors, with moderate to strong S.P. response and a variable positive magnetic response. The Blue and Valley zones have strong VLF, horizontal loop and S.P. responses, mainly caused by graphite and sulphides. Magnetic conductors are weak to absent.

Diamond drilling (4 holes) tested two of the zones with a total of 314.3 m. Samples taken from the drill core and outcrop revealed varying concentrations of gold.

AU 2,3 CLAIMS

Great Bear Development Corp.	Gold
710 - 475 Howe St.	76 E/11, 14
Vancouver, B.C., V6C 2B3	65°44'30"N,111°24'W

REFERENCES

Baragar and Hornbrook (1963); Bostock (1980); Tremblay (1976).

DIAND assessment report 081740.

PROPERTY

AU 2,3.

LOCATION

The claims are 395 km northeasterly of Yellowknife in the vicinity of Sun Bay on Contwoyto Lake (Figs. 8-22, 8-22a).

HISTORY

The Canadian Nickel Company Ltd. first discovered gold in the area in 1960. In 1961, a staking rush took place and most of the area was staked. The AU 2,3 claims were originally staked as a number of smaller claims by various companies. The northern, western and central part of the claims were staked as the PAT claims (Giant Yellowknife Mines) and the ESKIMO, WHITE and SUN claims (Eskimo Syndicate). To the south were the Earl-Jack Syndicate's JE claims and the Big Four Syndicate's SP claims. The eastern part of the AU 2,3 claims were originally part of the RY (Big Four), BL (Earl-Jack), and MOP (Canadian Nickel) claims (Baragar and Hornbrook, 1963; Tremblay, 1976). Much of the work done on the claims

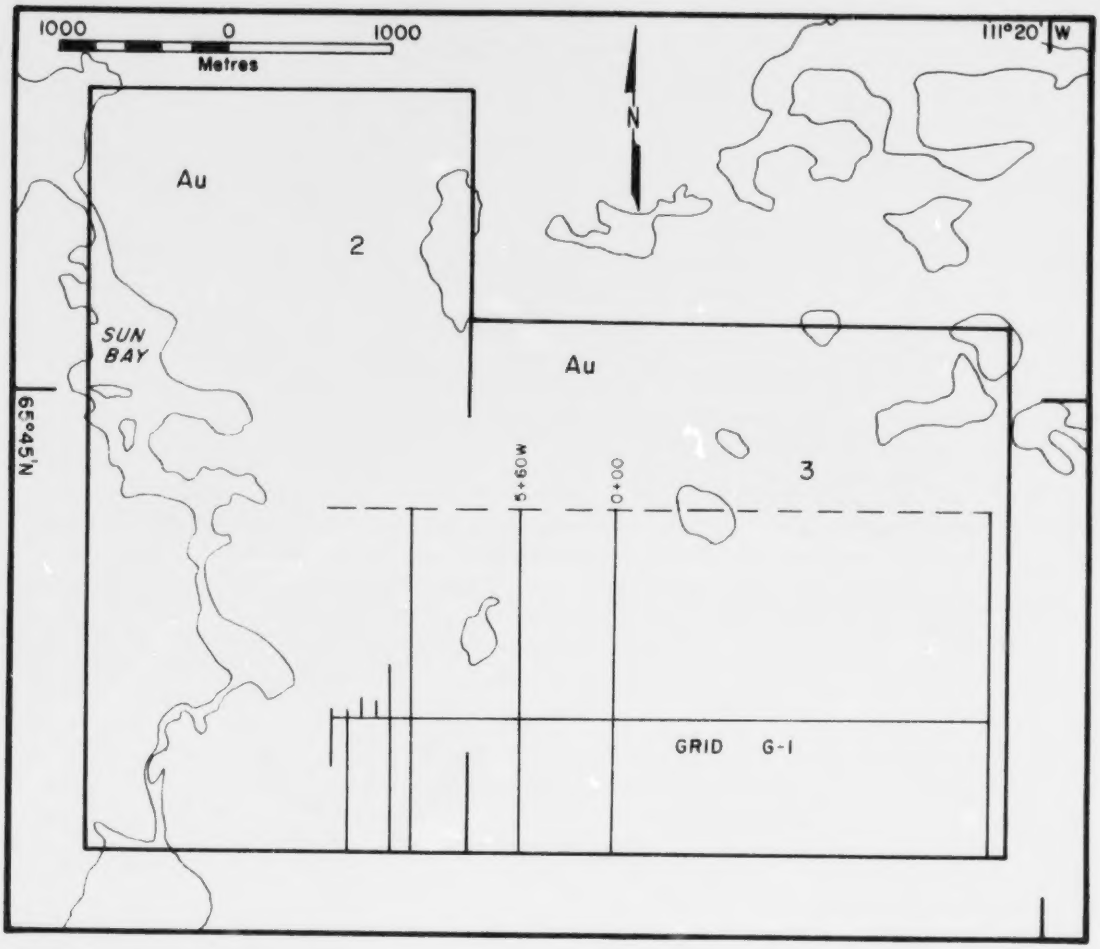


FIGURE 8-26: The AU 2,3 claims and Grid G-1.

was carried out between 1962 and 1964. By 1973, most of the claims had lapsed.

The present claims were recorded in February, 1981, and are now under option to Bow Valley Industries Ltd.

DESCRIPTION

The regional geology is shown in Figures 8-22 and 8-22a. Bostock (1980) and Tremblay (1976) have also mapped the area at 1:250,000 and 1:50,000 respectively.

CURRENT WORK AND RESULTS

In the fall of 1983, a grid (G-1) 4 km long and averaging 2.1 km wide was set up over the claims (Fig. 8-26). Side lines were spaced 80 m apart. Dip angle VLF-EM, total field magnetometer, and magnetic gradient surveys, as well as geological mapping were then carried out over the grid.

The VLF-EM survey delineated several weak to moderately strong conductors, many of which were coincident with positive easterly trending magnetic anomalies and spot magnetic highs. Many of the VLF and magnetic anomalies were associated with silicate-facies iron formation. The magnetic gradient survey indicated most of the iron formations with negative gradients.

Several iron formations intercalated with silty to argillaceous greywackes were mapped. The iron formations are spotted with sulphide minerals; the most common sulphide being pyrite. Fifteen grab samples of the iron formations were assayed for gold with the highest result being 0.240 g/tonne.

AU, BARB, KAP, MINER CLAIMS

Bow Valley Industries Ltd.	Gold
P.O. Box 6610, Postal Stn "D"	76 E/11
1800 - 321, 6th Ave., S.W.	65°40'N,111°12'W
Calgary, Alta., T2P 3R2	

REFERENCES

Baragar and Hornbrook (1963); Bostock (1980); Schiller and Hornbrook (1964); Seaton (1978); Tremblay (1976).

DIAND assessment report 081738, 080271, 017231, 017211, 017205, 017203, 017201, 017200, 017132, 017104 to 017106.

PROPERTY

AU 4,5,7,11; BARB 1; KAP 1-3; MINER.

LOCATION

The claims lie 390 km north-northeasterly of Yellowknife and west of Shallow Bay, Contwoyto Lake (Figs. 8-22, 8-22a).

HISTORY

Gold discoveries in the area in 1960 by the Canadian Nickel Company Ltd. resulted in a staking rush in 1961. Table 8-5 summarizes part of the history of the ground now covered by AU, BARB, KAP and MINER claims.

Most of these claims lapsed by 1973. Further references to the work done in the 1960's are Baragar and Hornbrook (1963), Schiller and Hornbrook (1964), and Tremblay (1976).

The PAN claims (now BARB 1) were re-staked in 1974 by N.J. Byrne and optioned to Precambrian Shield Resources Ltd. and Numac Oil and Gas Ltd. In 1976, the option was dropped and the claim returned to N. Byrne (Seaton, 1978).

TABLE 8-5: PREVIOUS WORK ON GROUND NOW HELD AS THE AU, BARB, KAP AND MINER CLAIMS

PRESENT CLAIM	OLD CLAIM	COMPANY NAME	WORK DONE	ASSESSMENT REPORT
AU 4	BAR group	Big Four Syndicate	1962,63 - geology, geophysics, diamond drilling.	017203, 017205.
	FOX claims	Conwest Exploration, optioned to Falconbridge Nickel Co. Ltd.	1961 to 1964 - geology, geophysics.	017211, 017231.
AU 5	NAT claims	New Athona Mines Ltd.	1962,63 - magnetometer, diamond drilling.	017105-6
	BAR 7,14,15,22	Big Four Syndicate	See above - AU 4	017203,5
AU 7	BAY group	Earl Jack Syndicate	1962 - geology, diamond drilling, geophysics.	017104
	ACE claims	Precambrian Mining Services Ltd.	1963 - geology	017201
AU 11	FUZ, MOR	Roberts Mining Co. Ltd.	1963 - geology	017132
BARB 1	ACE claims	Precambrian Mining	1963 - geology	017201
	NAT claims	New Athona Mines	See above - AU 5	017105-6
	PAN claims	Precambrian Mining	1963 - geology	017201
	PAN claims	Precambrian Shield Resources Ltd.	1975 - detailed magnetometer.	080271
KAP 1	NAT claims	New Athona Mines Ltd.	See above - AU 5	017105-6
	FRY claims	Roberts Mining Co. Ltd.	1963 - geology	017132
KAP 2,3	ROB claims	Roberts Mining Co. Ltd.	1963 - geology	017132
MINER	NAT claims	New Athona Mines Ltd.	See above - AU 5	017106
	BAR group	Big Four Syndicate	See above - AU 4	017203,5
	NOR group	North Goldcrest Mines Ltd.	1962 - geology	017200

The BARB 1 claim was recorded by P. Hungle in December, 1980 and transferred to Barren Lands Exploration Services Ltd. in February, 1981. It was then transferred to Highwood Resources Ltd. in January, 1983. In February of 1981, the AU 4,5,7,11 claims were recorded for Highwood Resources Ltd. Both the BARB and AU claims were transferred to Kappa Resources Ltd. in February of 1983, and then to Bow Valley Industries in April, 1984.

The KAP 1,3 and KAP 2, MINER claims were recorded by P. McKay and F. Diamond'C respectively in March, 1983, and transferred to Bow Valley Industries in April of 1984.

DESCRIPTION

The regional geology of the claims is shown in Figures 8-22 and 8-22a. Bostock (1980) and Tremblay (1976) have mapped the area at 1:250,000 and 1:50,000 respectively.

CURRENT WORK AND RESULTS

Work carried out over the claims in 1983 has been tabulated in Table 8-6. The work comprised geological mapping, diamond drilling and a variety of geophysical surveys on grids, shown on Figure 8-27. On the claims, gold appears to be associated with pyrite, pyrrhotite and locally arsenopyrite in silicate-facies iron formation.

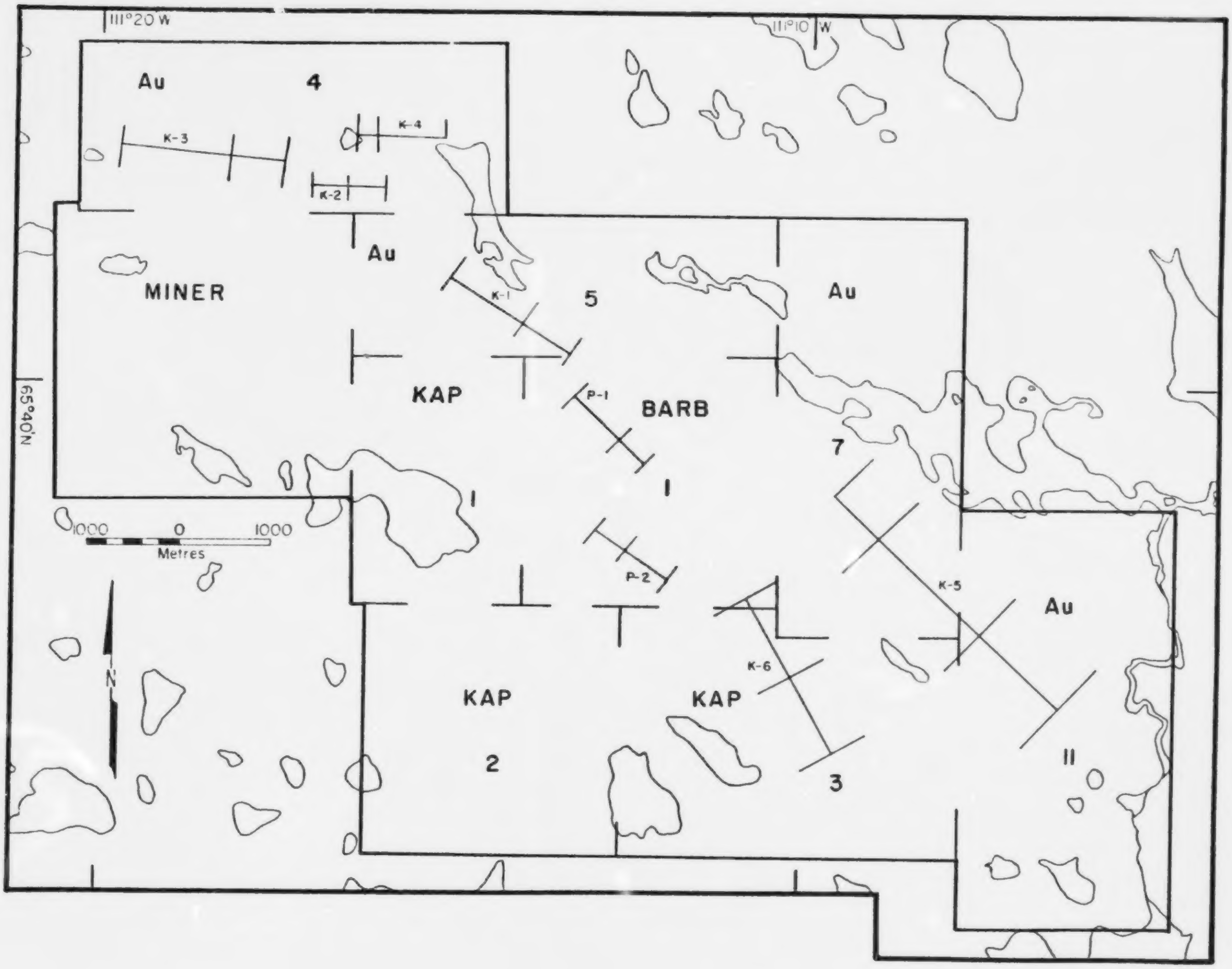


FIGURE 8-27: *The AU, BARB, KAP and MINER claims and grids.*

TABLE 8-6: AU, BARB, KAP, MINER CLAIMS - WORK DONE IN 1983

GRID	CLAIM	GEOLOGY	MAGNETIC SURVEYS	VLF-EM
P-1 (covers 1963 Pan Showing, PAN Claims)	BARB 1	1:1000; NW trending sediments interbedded with silicate facies Fe formation. A small syenite stock intrudes central part of claim.	Pan Showing - Series of weak magnetic lows and highs.	Pan Showing - no conductor. Another zone of iron formation indicated by moderately strong linear high.
P-2	BARB 1	1:1000; silicate facies iron formation occurring as pendants or xenoliths within syenite.	Outlines syenite/sediment contact. Three zones of complex dipoles and magnetic highs representing iron formation pendants. Two zones show no corresponding VLF response.	One strong conductor due to surface conductivity. One weak conductor coincident with complex anomalous magnetic response associated with the iron formation.
K-1 (covers No. 2 Showing 1962 PAN Claims)	AU 5	1:2000; two parallel layers easterly trending of Fe formation interbedded with greywacke and argillite.	One zone of magnetic high corresponding with iron formation.	Four weak conductors - 3 due to overburden. The fourth due to silicate facies iron formation.
K-2	AU 4	1:2000; sediments interbedded with thin discontinuous layers of iron formation.	Relatively flat response.	No conductors revealed.
K-3	AU 4	1:2000; similar to K-1 and K-2. Three layers of iron formation.	Weak to moderately strong discontinuous anomalies attributable to Fe formation.	Weak discontinuous conductors associated with iron formations.
K-4	AU 4	1:2000; similar to K-3; 3 zones of silicate facies iron formation. One zone also contains oxide facies.	Oxide facies exhibits strong positive magnetic response. Central iron formation represented by complex dipoles and weak magnetic highs.	Weak to very weak response for central and southern iron formations.
K-5	AU 7,11 KAP 3	1:2000; silty to argillaceous sediments with layers and lenses of Fe formation. Eight to 10 exposed Fe formations.	Iron formations show spot magnetic highs and negative gradient anomalies.	One strong conductor due to pyrite in mineralized Fe formation.
K-6	KAP 3	1:2000; greywackes, interbedded with narrow continuous Fe formation layers. Three zones, 1 rich in sulphides.	Iron formations - weak positive magnetic response close to strong magnetic response of diabase dyke.	Weak to strong conductors indicative of the sulphide bearing iron formation.

SELF POTENTIAL	DIAMOND DRILLING	MINERALIZATION
Large negative anomaly corresponds to VLF anomaly. Pan Showing - negative anomaly over northern half.	Three holes for a total of 217.39 m. Encountered varying gold concentrations.	1963 results returned 8.4 g/t Au over Pan Showing. Present results show varying concentrations of Au; best gold results associated with banded pyrrhotite and minor arsenopyrite phenocrysts.
		Nine grab samples from northwestern part of grid revealing varying concentrations of gold. Associated with pyrrhotite, pyrite and minor arsenopyrite in iron formation.
Weak negative response corresponding with VLF conductor.	One hole 77.13 m to test VLF conductor; intersected 2 weakly mineralized iron formation layers.	Surface sampling 0.274 g/t and 0.137 g/t Au. Subsurface 0.342 g/t Au. Gold associated with disseminated pyrite and pyrrhotite.
		One zone of mineralized iron formation. Six grab samples revealing varying gold concentrations associated with pyrrhotite, pyrite and arsenopyrite.
		Au is associated with pyrrhotite, pyrite-bearing iron formation. One Fe formation rich in arsenopyrite. Varying gold concentrations in excess of 1 g/t Au.
		Central and southern iron formations associated with disseminated pyrite, pyrrhotite with varying Au concentrations.
		Sulphides light to sparse, locally concentrated. Usually pyrite, pyrrhotite, locally arsenopyrite, chalcopyrite. Most of iron formation contains little or no sulphides. Grab sampling revealed nil to 2.806 g/t Au.
		Varying gold concentrations, associated with pyrrhotite, pyrite and locally, arsenopyrite.

FIN CLAIMS

Aber Resources Ltd.
675 West Hastings St.
Vancouver, B.C., V6B 1N2

Gold
76 E/11
65°44'N,111°10'W

REFERENCES

Bostock (1980); Gibbins and others (1977); Seaton (1984); Tremblay (1976).

DIAND assessment reports 081745, 081319, 080159.

PROPERTY

FIN 1-36.

LOCATION

The claims are 400 km north-northeasterly of Yellowknife and south of the Lupin Mine site (Figs. 8-22, 8-22a).

HISTORY

The FIN 1-34 claims were staked in July and August of 1974 by Canadian Superior Exploration Ltd. over ground originally staked as the FOX claims by Conwest Exploration Company Ltd. and subsequently optioned to Falconbridge Nickel Mines Ltd. (Gibbins and others, 1977; Tremblay, 1976). Ground magnetometer and self potential surveys were carried out over the claims in 1974, and diamond drilling in 1981 (Seaton, 1984; DIAND assessment reports 080159, 081319). In 1982, Aber Resources Ltd. purchased FIN 1-34. These were then optioned to Bow Valley Industries Ltd. in April, 1983. FIN 35, 36 were recorded in August of 1983, and placed under option to Bow Valley Industries in July of 1984.

DESCRIPTION

Figures 8-22 and 8-22a show the regional geology of the claims. The FIN claims are underlain predominantly by Archean metasediments with iron formation lenses and minor rhyolitic and andesitic rocks. Maps have also been compiled by Bostock (1980) and Tremblay (1976) at 1:250,000 and 1:50,000 respectively.

CURRENT WORK AND RESULTS

In the summer of 1983, a grid (Fig. 8-25) was set up over the FIN 1-36 claims and detailed geology, magnetometer, and VLF-EM surveys conducted. Additional detailed magnetometer, VLF-EM, and self-potential (S.P.) surveys and diamond drilling (256.4 m) were then undertaken.

The geological and geophysical surveys, compiled at 1:2000 scale, revealed five areas requiring more work. Detailed geophysics on these areas outlined numerous VLF conductors coincident with magnetic anomalies and silicate-facies iron formations. Some of these anomalies were tested by drilling. Four holes were drilled. Subsurface pyrrhotite-bearing silicate-facies iron formation was intersected in three holes. Strong S.P. anomalies are apparently caused by graphite.

Grab sample assays of iron formation taken during geological mapping of the area assayed from a trace to 1.711 g/t Au. Iron formations cut in one hole gave various gold assays.

HOOD RIVER-TAKIJUQ LAKE SUPRACRUSTAL BELT

This belt, part of which is shown in Figure 8-28, was referred to in the 1975 Mineral Industry Report as the Hawk Lake Belt, which included at its southern end the Takijuq South Segment. Hawk Lake is the unofficial name of a small lake 20 km south of the Hood River. Noranda explored the HAWK and other claims from a camp at Hawk Lake in 1975 (Seaton, 1978).

In the 1980-1981 Mineral Industry Report the Hawk Lake Belt has been renamed the Hood River-Takijuq Lake Supracrustal Belt, to avoid the use of an unofficial name related to now lapsed claims. The name "Hood River Belt" is not used because this has been popularly used by exploration personnel to refer to the southern (76L) part of the High Lake Supracrustal Belt. The spelling "Takijuq Lake" is taken from the Gazetteer of Canada. Takijua Lake has been referred to in various publications as Takijuk and Takiyuak Lake. For consistency of spelling, that part of the belt near the south end of Takijuq Lake is here referred to as the Takijuq - not Takijuk - South Segment.

Most of the Hood River-Takijuq Lake Supracrustal Belt is composed of mafic volcanics, but in the Takijuq South Segment, felsic and intermediate volcanics underlie an 8 km long by 1.5 km wide area south of Amoogabooga Lake (unofficial name coined by Kidd Creek Mines), a 7 km-long east-northeasterly trending lake centred at 64°04'45"N, 112°-34'30"W. Weakly argentiferous zinc-copper deposits outcrop near Amoogabooga Lake.

The Hood River-Takijuq Lake Supracrustal Belt is about 125 km long and from 2 km to 16 km wide. It is widest at the Takijuq South Segment, which adjoins

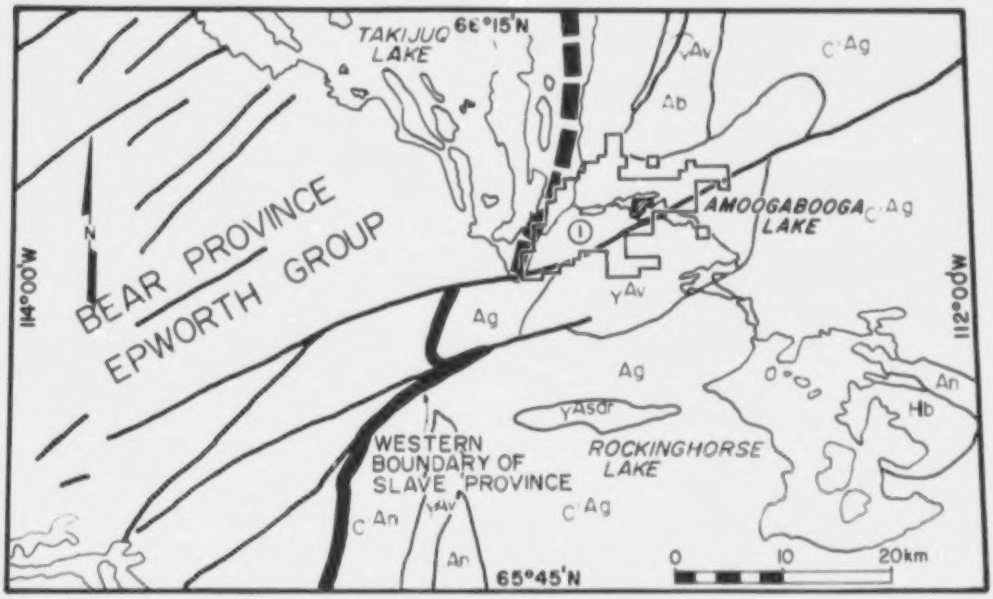


FIGURE 8-28: Regional geology and properties for part of the Hood River-Takijuq Lake Supracrustal Belt. Geology from McGlynn (1977).

LEGEND FOR FIGURE 8-28

PROTEROZOIC

Hb	Gabbro sills and sheets. Includes Coronation and Franklin intrusions

ARCHEAN

C'An C'Ag	Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup
Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks
Ab	Gabbro, anorthosite, diorite and minor ultramafic rocks

YELLOWKNIFE SUPERGROUP

YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAv	Volcanic rocks, undivided

PROPERTIES

① HOOD, HOOD A, HOOD B, HOOD C claims

▨ Area drilled

Segment trends mainly east-northeasterly; the remainder of the Hood River-Takijuq Lake Belt trends N23°E.

At its northern end the Hood River-Takijuq Lake Supracrustal Belt is within a few kilometres of the southern end of the Anialik River Supracrustal Belt. The southwestern end of the Takijuq South Segment is about 10 km northeasterly of the northern end of the Point Lake Supracrustal Belt.

For work done on the Hood River-Takijuq Lake Supracrustal Belt, see Table 8-1.

POINT LAKE SUPRACRUSTAL BELT

This belt, part of which is shown in Figure 8-29, extends from roughly 30 km south of Point Lake to 10 km south of Takiiuq Lake. It trends northerly to slightly east of north; is roughly 100 km long and; except at its ends, is from 2 km to 8 km wide. The Point Lake Supracrustal Belt is continuous with the Point Lake-Providence Lake-Newbigging Lake-Thoolezzeh Lake Supracrustal Belt, which diverges easterly from the Point Lake Supracrustal Belt at Point Lake to follow an arcuate southerly course from 65°15'N to roughly 64°00'N.

The Point Lake Supracrustal Belt is here defined

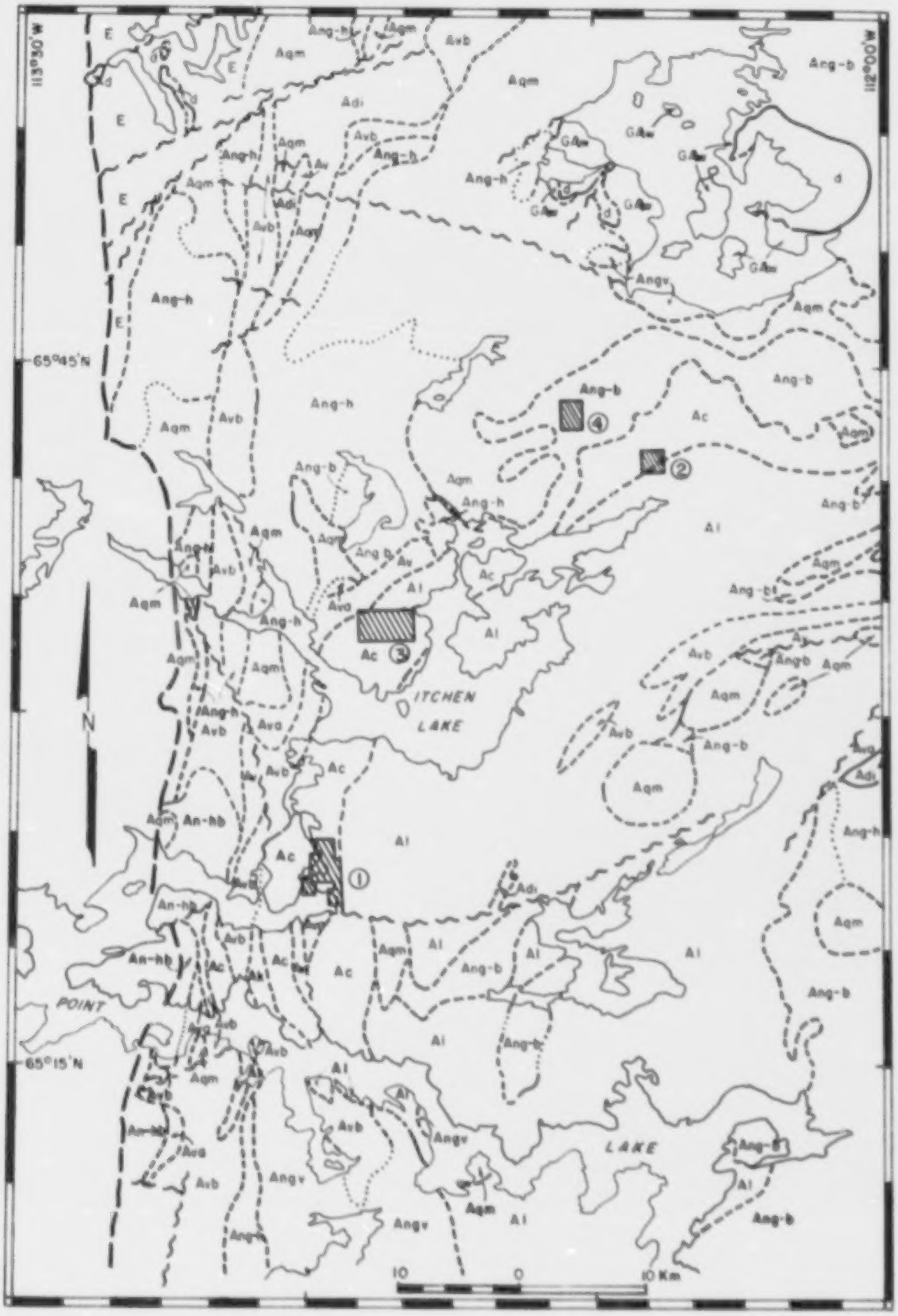

113°30'W
112°00'W
65°45'N
65°15'N
N
ITCHEN
LAKE
POINT
LAKE
E
d
GAm
Aqm
Avb
Adi
Ang-h
Ang-b
Angv
Ac
Al
Ava
An-hb
Angb
①
②
③
④
10
0
10 Km

FIGURE 8-29: Regional geology and properties in the Point Lake Supracrustal Belt. Geology modified after Bostock (1980).

LEGEND FOR FIGURE 8-29

PROTEROZOIC

d	Diabase, gabbro: dykes and sills
E	Epworth Group: sandstone, limestone, argillite, siltstone, quartzite, greywacke, stromatolitic dolomite
aAw	Goulburn Group: Western River Fm - argillite, greywacke, quartzite, siltstone

ARCHEAN

LATE KENORAN PLUTONIC ROCKS

Aqm	Quartz-monzonite, granodiorite; some granite
Adi	Diorite, granodiorite; some amphibolite

YELLOWKNIFE SUPERGROUP

Ai	Itchen Fm: metaturbidites lacking iron formation lenses - greywacke, argillite, slate, nodular schists and gneisses
Ak	Keskarrah Fm: metavolcanic fanglomerate-conglomerate, subgreywacke
Ac	Contwoyto Fm: metaturbidites containing iron formation lenses - argillite, siltstone, slate, greywacke

EARLY KENORAN (?) PLUTONIC ROCKS

Avb	Point Lake Fm: metavolcanic and related metasedimentary rocks - mafic flows, tuffs, black slate
Av	Mixed felsic to mafic tuffs, some amphibolite, hornblende gneiss, and calc-silicate rocks
Avo	Felsic flows and tuffs

HYBRID ROCKS

An-hb	Banded to foliated biotite, hornblende gneisses
Ang-b	Lit-par-lit gneiss and schist, mostly biotite-rich
Angv	Felsic and/or mafic volcanic and hypabyssal rocks
Ang-h	Dioritic agmatic, mafic volcanic rocks

PROPERTIES

① REN claims
② SIK claims
③ CUB 1
④ SKI claims

as the Western Volcanic Belt of Bostock (1980), together with the area underlain by metasediments of the Contwoyto Formation that flank the volcanics to the east. The Contwoyto Formation is overlain by metasediments of the Itchen Formation, which fill a basin that lies between the Western Volcanic Belt, the Rockinghorse Batholith, the Central (Olga Lake) Volcanic Belt and Batholith, the Yamba Batholith and some smaller batholiths and plutons.

The Point Lake Supracrustal Belt includes, in ascending stratigraphic sequence, mainly mafic volcanics of the Point Lake Formation, conglomerates of the Keskarrah Formation, and metaturbidites of the Contwoyto Formation. The Contwoyto Formation hosts iron formation lenses that are locally auriferous.

The Keskarrah Formation does not extend north of the northern arm of Point Lake. It contains clasts derived both from pre-Yellowknife Supergroup basement and from the Point Lake Formation. In places the Keskarrah Formation rests unconformably on basement rocks, elsewhere it overlies and interfingers with the Point Lake Formation. The contact between the Contwoyto and Itchen Formations is not clearly defined. If the iron formation lenses in the Contwoyto Formation have a volcanic source, and if the source volcanics are restricted to the basin margins - as appears to be commonly the case - the Itchen Formation, which contains no iron formation, would appear to be a distal facies of the Contwoyto Formation. Calcareous argillite, present in the

Contwoyto Formation but absent in the more widespread Itchen Formation, may likewise have derived its calcareous component from either contemporaneous vulcanism or from nearby mafic volcanics of the Point Lake Formation. Elsewhere in the Slave Province, as near the Hackett River Volcanic Belt and the Back River Volcanic Complex, the volcanics are commonly fringed by calcareous rock units and iron formation.

For properties explored see Table 8-1.

RUSSELL LAKE-INDIN LAKE SUPRACRUSTAL BELT

The Indin Lake Supracrustal Belt (Figs. 8-30, 8-30a) is a sinuous belt of metavolcanics and metasediments, near the western margin of the Slave Province. Indin Lake is roughly 75 km north of the southern end of the belt.

An "isthmus" of metasediments joins the Indin Lake Supracrustal Belt with the Russell Lake Belt to the south (Fig. 8-30). 1982/83 exploration work in this area is detailed below and in Table 8-1.

BON CLAIMS

Noranda Exploration Co. Ltd.	Gold
4 - 2130 Notre Dame Ave.	85 J/13
Winnipeg, Man., R3H 0K1	62°54'30"N,115°54'W

REFERENCES

Henderson (1976).

DIAND assessment report 081694; Energy, Mines and Resources (EMR) Mineral Inventory File.

PROPERTY

BON 1-4.

LOCATION

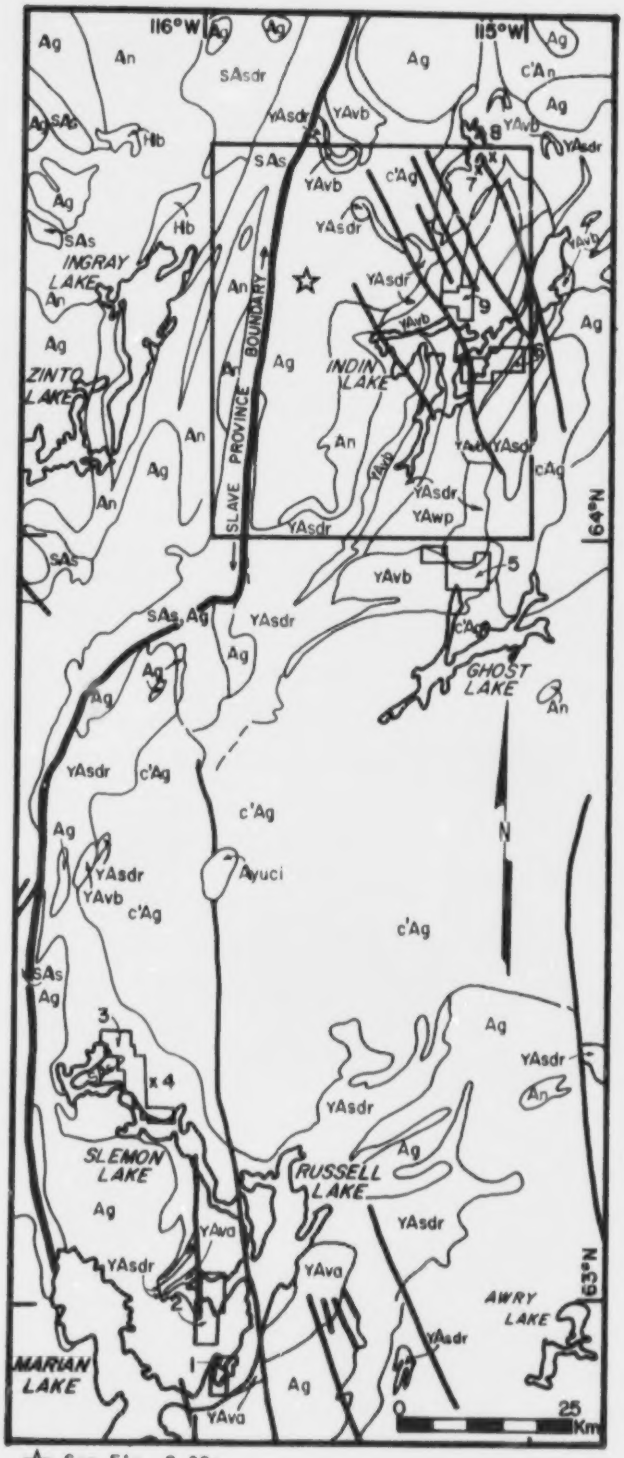
The claims are 95 km west-northwesterly of Yellowknife on a peninsula on the west side of Russell Lake (Fig. 8-30).

HISTORY

The BON claims were recorded in September of 1981 and are part of what was originally the SEVENORE claims. The SEVENORE claims were staked in 1945, and prospected and trenched in 1946.

DESCRIPTION

Figure 8-30 shows the regional geology of the area. A compilation of the area at 1:125,000 has also been done by Henderson (1976).


116°W
115°W
64°N
63°N
INGRAY LAKE
ZINTO LAKE
INDIN LAKE
GHOST LAKE
SLEMON LAKE
RUSSELL LAKE
AWRY LAKE
MARIAN LAKE
SLAVE PROVINCE BOUNDARY
Ayuci
Ag
An
Hb
SAs
SAsdr
YAsdr
YAvb
YAva
YAwp
c'Ag
C'An
N
1
2
3
4
5
7
8
9
0
25
Km

☆ See Fig. 8-30a

FIGURE 8-30: Regional geology and properties in the Russell Lake - Indin Lake Supracrustal Belt. Geology from McGlynn (1977).

LEGEND FOR FIGURES 8-30 AND 8-30a

PROTEROZOIC

Hb	Gabbro sills and sheets. Includes Coronation and Franklin intrusions

HEPBURN METAMORPHIC-PLUTONIC BELT

Ag	Granodiorite, quartz monzonite, granite
An	Migmatite, veined gneiss, granitic gneiss. Includes undifferentiated metamorphosed Snare or Epworth rocks

SNARE GROUP

SAs	Siltstone, shale, quartzite, dolomite, minor intermediate volcanics
SAsdr	Metamorphosed Snare rocks
Ayuci	Nepheline syenite, carbonatite. May be younger than some Aphebian sedimentary sequences. Temporal relationship unknown

ARCHEAN

An'	Mixed gneisses and granodiorite of probable Archean age in the Bear Structural Province
C'An C'Ag	Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup
Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks

YELLOWKNIFE SUPERGROUP

YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAwp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
YAva	Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks
YAvb	Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks
CAg	Complex of plutonic gneisses, commonly of tonalite composition, in part cataclastic, that are basement to Yellowknife Supergroup. May include some younger plutonic rocks

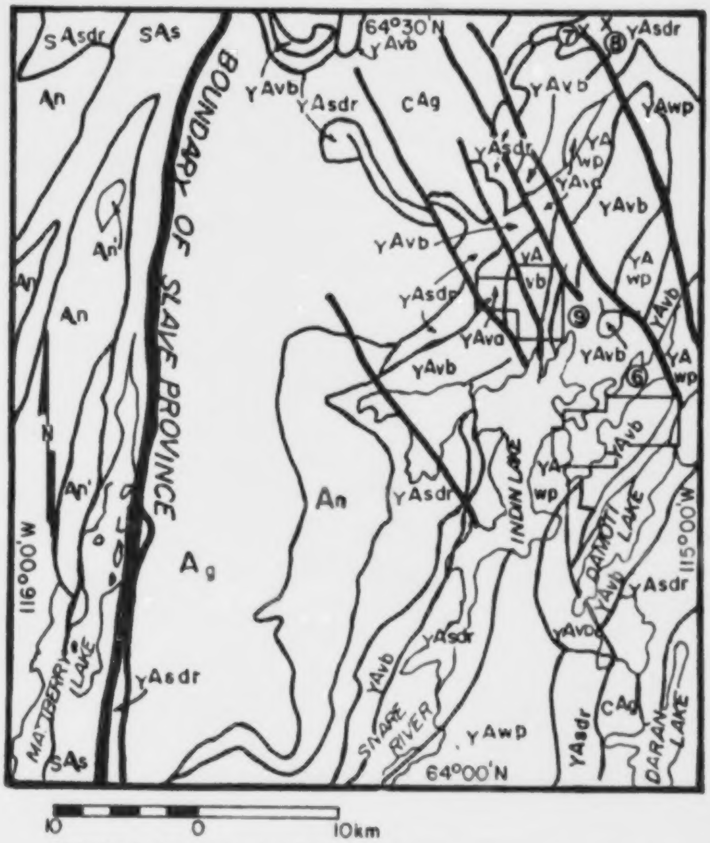


FIGURE 8-30a: Inset of Indin Lake Supracrustal Belt. Property numbers and geological symbols are the same as those for Figure 8-30.

PROPERTIES

① BON claims	⑤ WIJ, INN, EDI claims
② BET, RUSS claims	⑥ BETAM 1 - 4
③ JEAN, LEMON, LEMONAID claims	⑦ DAN 9
	⑧ EAEC
④ DON 3, 4	⑨ KIM 4, 5

CURRENT WORK AND RESULTS

In 1982, the claims were explored by geological mapping, prospecting, and geophysics. The BON claims are underlain by Archean metasedimentary rocks, in particular, cordierite-bearing metagreywacke which hosts northerly striking carbonate-pyrite-bearing exhalite. Six samples, most from carbonate-pyrite-bearing exhalite, were taken and analyzed for gold, with results ranging from less than 10 to 156 ppb Au.

The geophysics surveys were set out over a grid (Fig. 8-31) with station intervals of 25 m. VLF-EM

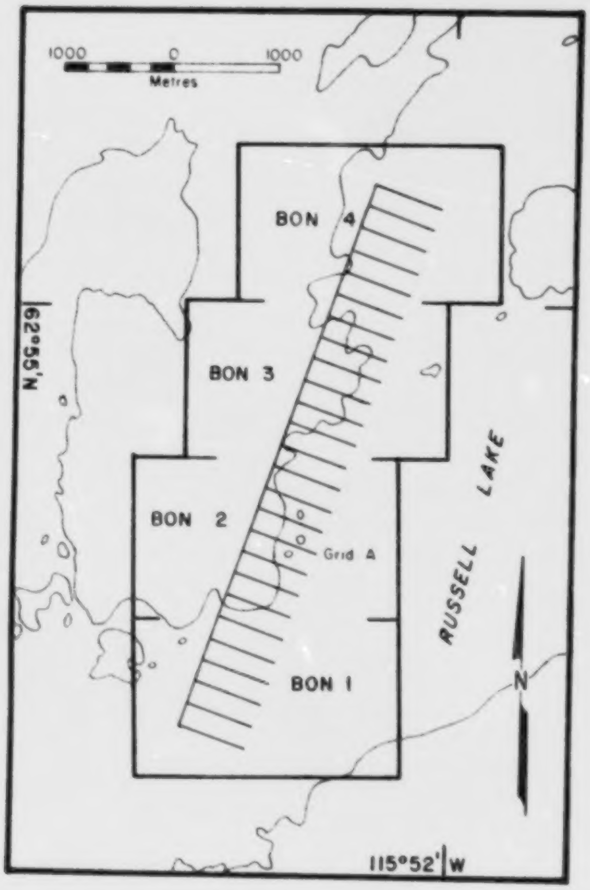

1000
0
1000
Metres
BON 4
BON 3
BON 2
BON 1
Grid A
RUSSELL LAKE
N
62°55'N
115°52'W

FIGURE 8-31: BON claims and Grid A.

and magnetometer surveys were carried out. Three magnetic anomalies were indicated in the central area of the grid.

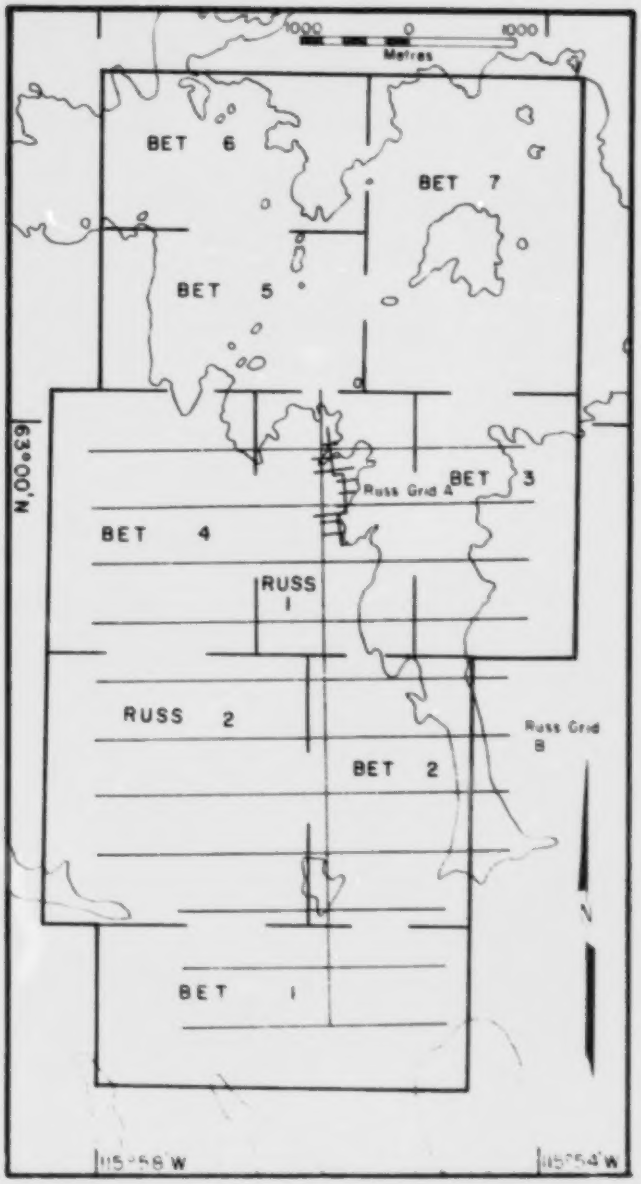

1000
0
1000
Metres
BET 6
BET 7
BET 5
BET 3
BET 4
Russ Grid A
RUSS 1
RUSS 2
Russ Grid B
BET 2
BET 1
N
63°00'N
115°58'W
115°54'W

FIGURE 8-32: BET and RUSS claims and grids.

BET, RUSS CLAIMS

Noranda Exploration Co. Ltd.	Gold
4 - 2130 Notre Dame Ave.	85 J/13; 85 O/4
Winnipeg, Man., R3H 0K1	62°59'30"N,115°57'W

REFERENCES

Henderson (1976); Lord (1942).

DIAND assessment report 081633; Energy, Mines and Resources (EMR) Mineral Inventory File.

PROPERTY

BET 1-7.

RUSS 1,2.

LOCATION

The claim is 100 km northwesterly of Yellowknife on the west side of Russell Lake (Fig. 8-30).

HISTORY

The property was originally part of the SEVENORE 1-12 claim group staked in 1945 upon the discovery of gold there by K. Murray. In 1946 the claims were acquired by Fort Rae Gold Mines Limited. Bear Exploration and Radium Limited, under a stock purchase agreement with Fort Rae Gold Mines, explored a gold showing known as the "Sevenore stock". (EMR Mineral Inventory File).

The property was re-staked later as the EKK claims. These claims lapsed and were then re-staked as TIP 1-28 by Kerr Addison Mines Ltd.

The RUSS 1,2 claims were recorded for Noranda in May of 1981. The BET 1-7 claims were recorded in September of 1981.

DESCRIPTION

Figure 8-30 shows the regional geology of the area. The southern part of the claim group is within the area covered by Henderson's (1976) 1:125,000 geological map. The northern part of the claims are in the area mapped by Lord (1942) at 253,440.

CURRENT WORK AND RESULTS

In 1981 and 1982 exploration work was carried out over the RUSS and BET claims. Work comprised geological mapping, prospecting, sampling, magnetometer and VLF-EM surveys.

The claims are underlain by metagreywackes and banded iron formations intruded by numerous granodiorite (the Sevenore stock) and quartz monzonite intrusions. Sampling confirmed the presence of gold in fractures and quartz veins of the Sevenore stock. A total of 94 samples were taken and analyzed for gold, silver, copper, lead and zinc. Gold is also concentrated in iron formation adjacent to the stock.

Two magnetometer surveys were carried out in 1981 and 1982. A detailed survey of RUSS Grid A evaluated the Sevenore stock showing in 1981. A reconnaissance survey of the RUSS Grid B, in 1982, explored the RUSS 1,2 and BET 1-4 claims (Fig. 8-32). The magnetometer surveys outlined magnetic highs over the iron formations, which are probably caused by magnetite, and a low over the Sevenore stock.

A VLF-EM survey in 1982 provided inconclusive results.

JEAN, LEMON, LEMONAID CLAIMS

Noranda Exploration Co. Ltd.	Gold
4 - 2130 Notre Dame Ave.	85 N/1,8
Winnipeg, Man., R3H 0K1	63°17'N,116°08'W

REFERENCES

Lord (1942, 1951); Padgham and others (1976).

DIAND assessment report 081634.

PROPERTY

JEAN 1-5, LEMON, LEMONAID.

LOCATION

The claims are 130 km northwesterly of

TABLE 8-7: SUMMARY OF THE HISTORY OF GROUND NOW HELD AS THE JEAN, LEMON, LEMONAID CLAIMS

COMPANY NAME	CLAIM	YEAR	REFERENCE	PRESENT CLAIM
J. Lundmark; W. Lahti	AU 5,6,13,24	1939	Lord, 1951 Old claim maps.	JEAN Group
Frederick Yellowknife Gold Mines Ltd.	RO 17,18	1945	"	"
Slemon Yellowknife Gold Mines Ltd.	bought RO and AU claims	1945	"	"
"	JOE 1-6, GUS 4-6, PEG 4, FAYE 1-11, JOHNNY 1, CHER 1-5, PIN 1,4, DON Group, PINCHER FRACTION	1946	"	JEAN Group, LEMONAID
Snare River Exploration Company Ltd.	SR Group	1946	Lord, 1951	LEMON
Slemon Yellowknife Gold Mines Ltd.	DON Group?	1946?	Old claim maps	"
?	ALP Group, previously SR	?	Claim Index	"
Anglo United Development Corp.	SAP 1-6, previously ALP, lapsed in 1976.	1972	Padgham and others (1976)	"

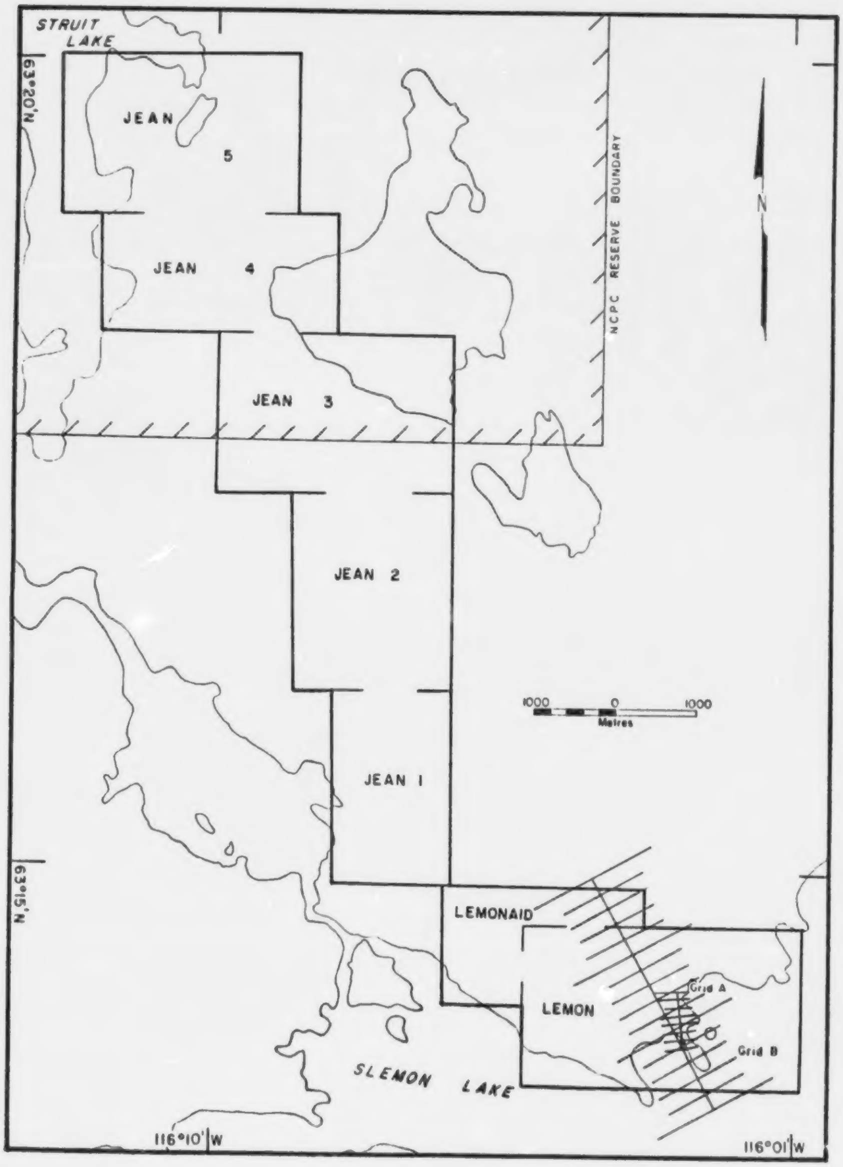

STRUIT LAKE
63°20'N
JEAN 5
JEAN 4
JEAN 3
JEAN 2
JEAN 1
NCPC RESERVE BOUNDARY
N
1000 0 1000
Metres
63°15'N
LEMONAID
LEMON
Grid A
Grid B
SLEMON LAKE
116°10'W
116°01'W

FIGURE 8-33: JEAN, LEMON and LEMONAID claims and grids.

Yellowknife, and north of Slemon Lake (Fig. 8-30).

HISTORY

Ground currently held as the JEAN, LEMON and LEMONAID claims has been staked by various companies since 1939 (Table 8-7).

The LEMON claim was recorded in May; JEAN 1-5 in September; and LEMONAID in October of 1981.

DESCRIPTION

The regional geology is shown in Figure 8-30. Lord (1942) described the geology of the Snare River and Ingray Lake map areas, for which he prepared maps at 1:253,440.

CURRENT WORK AND RESULTS

THE LEMONAID and JEAN claims were staked after geological mapping and prospecting on the LEMON claims and surrounding area in 1981.

Geological mapping at 1:11,750 revealed isoclinally folded metagreywackes interbedded with banded iron formation. The iron formation hosts gold (the SAP showing) associated with magnetite and sulphides. A detailed geological map was made of the SAP showing (1:2000 scale of Grid A, Fig. 8-33). Ninety-three samples were taken and analyzed for gold, silver, copper, lead and zinc. Anomalous gold concentrations are associated with the iron formations.

In 1982, magnetometer and VLF-EM surveys over Grid B in 1982 (Fig. 8-33) showed the iron formations give rise to magnetic highs that can be traced across the claims. VLF results were inconclusive.

BETAM CLAIMS

Noranda Exploration Co. Ltd.	Gold
4 - 2130 Notre Dame Ave.	86 B/3
Winnipeg, Man., R3H OK1	64°13'N,115°05'W

REFERENCES

Seaton (1984); Tremblay and others (1953).

DIAND assessment report 081625.

PROPERTY

BETAM.

BETAM 2-4.

LOCATION

The claims are 200 km north-northwesterly of Yellowknife on the eastern side of Indin Lake (Figs. 8-30, 8-30a).

HISTORY

Gold was first discovered in the region in the late 1930's and most of the area was staked by the early 1940's. Ground currently held as the BETAM claims has been staked under various names and by various companies since then; as, for example, the VAN 1-36 claims, staked by Freeport Canadian Exploration Ltd. in 1970. Several of the VAN claims lapsed in 1976; the rest in 1980. A more detailed history is given by Seaton (1984).

The BETAM claim was recorded by Noranda in May, 1981; the BETAM 2-4 claims in September, 1981.

DESCRIPTION

The regional geology of the claims is shown in Figures 8-30 and 8-30a. Tremblay and others (1953) have compiled a more detailed map at 1:63,360.

The claims are predominantly underlain by mafic volcanics in contact with sediments to the east near Damoti Lake and to the west near Indin Lake. Numerous granitic dykes and quartz-feldspar porphyry dykes intrude the volcanics.

CURRENT WORK AND RESULTS

In 1982, follow-up geological mapping and prospecting were carried out over areas of interest discovered during the 1981 exploration project (Seaton, 1984). The felsic intrusive and felsic volcanics, near a lake informally known as Andy Lake, and the rhyolite on BETAM 4 were re-examined (Fig. 8-34).

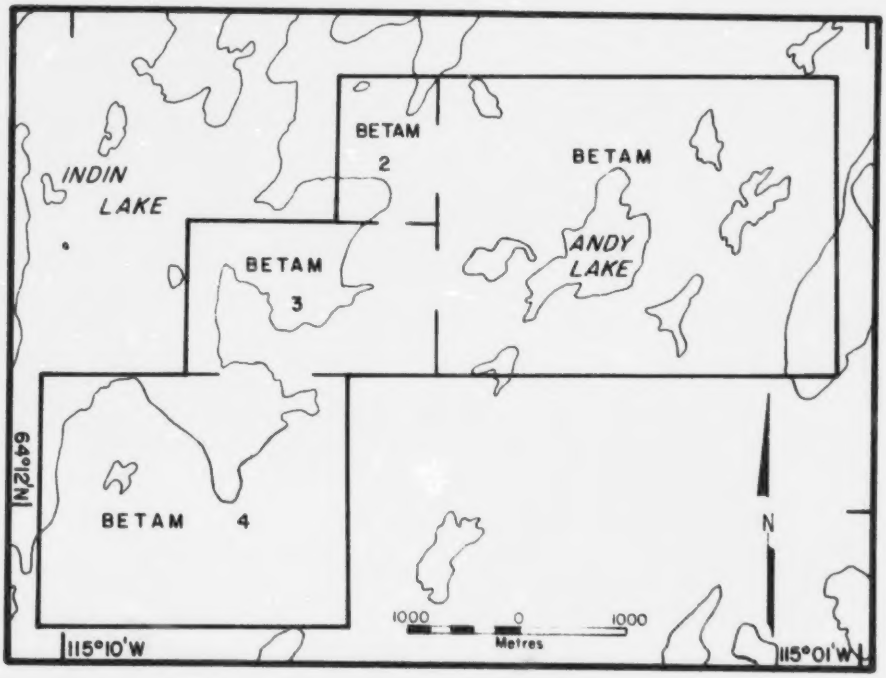


FIGURE 8-34: The BETAM 1-4 claims.

One hundred and eighteen rock samples were taken from the BETAM claims and surrounding area and analyzed for gold, silver, copper, lead and zinc. The samples ranged from less than 5 to 3428 ppb Au. Eleven of the best anomalies (greater than or equal to 100 ppb Au) are associated with quartz veins and volcanics around Andy Lake. Copper, lead and zinc anomalies coincided with gold anomalies. No gold occurrences of economic importance were discovered.

EAEC CLAIM

Treasure Island Res. Corp.	Gold
55A Powell St.	86 B/6
Vancouver, B.C., V6A 1E9	64°29'30"N,115°07'30"W

REFERENCES

Lord (1942, 1951); Padgham and others (1978).

DIAND assessment report 081680.

PROPERTY

EAEC 1.

LOCATION

The claim is 230 km north-northwesterly of Yellowknife on Treasure Island in Spider Lake (Figs. 8-30, 8-30a, 8-35).

HISTORY

The property was formerly staked as part of the FLY No. 1 claim group, which was first recorded in 1945 by Trans-American Mining Corporation Ltd. In 1946 these claims were acquired by Spinet Mining Company Ltd., which later became Spinet Gold Mines Inc. (Lord, 1951). In 1969, the claims were re-staked by J. Mason as the DAN group and were later transferred to Treasure Island Resources (Padgham and others, 1978).

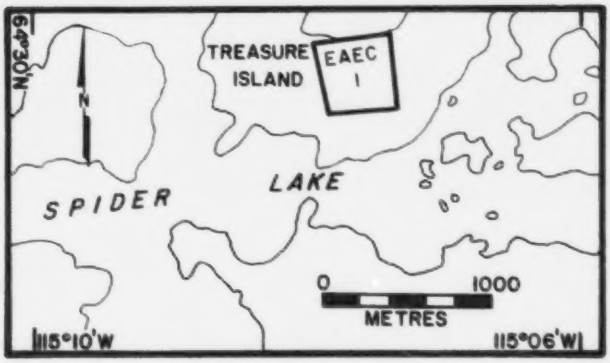


FIGURE 8-35: The EAEC claim on Treasure Island.

The EAEC 1 claim was recorded in October, 1978.

DESCRIPTION

The regional geology of the area is shown in Figures 8-30 and 8-30a. A map at 1:253,440 has also been produced by Lord (1942).

CURRENT WORK AND RESULTS

The claim was geologically reconnoitred in the spring of 1983. The predominant rock type is an amphibolite schist of Archean age; part of the Yellowknife Supergroup series. No gold-bearing quartz veins were observed.

KIM CLAIMS

Comaplex Res. Intern'tl Ltd.	Gold
901, 1015 Fourth St. S.W.	86 B/6
Calgary, Alta., T2R 1J4	64°19'30"N,115°14'W

REFERENCES

Lord (1951); Seaton (1984); Stanton (1947); Stanton and others (1954).

DIAND assessment report 081698.

PROPERTY

KIM 4, 5.

LOCATION

The claims are 215 km north-northwesterly of Yellowknife, north of Indin Lake (Figs. 8-30, 8-30a).

HISTORY

There has been intermittent gold and copper-zinc exploration in the area since the 1930's. Much of the work done on the claims was by Lexindin Gold Mines Ltd. in the 1940's (Stanton, 1947; Lord, 1951). The history of the KIM claims is summarized further by Seaton (1984).

The claims were recorded in February, 1981.

DESCRIPTION

The regional geology is shown in Figures 8-30 and 8-30a. Stanton (1947) and Stanton and others (1954) have mapped the area at 1:31,680 and 1:63,360 scales respectively. The KIM 4, 5 claims are underlain by rocks of the Yellowknife Supergroup. Mafic to intermediate volcanics dominate overall, and are in contact with tuffaceous sediments, greywackes and slates. The north-central part of the KIM 4 claim is underlain predominantly by dacites and rhyolites.

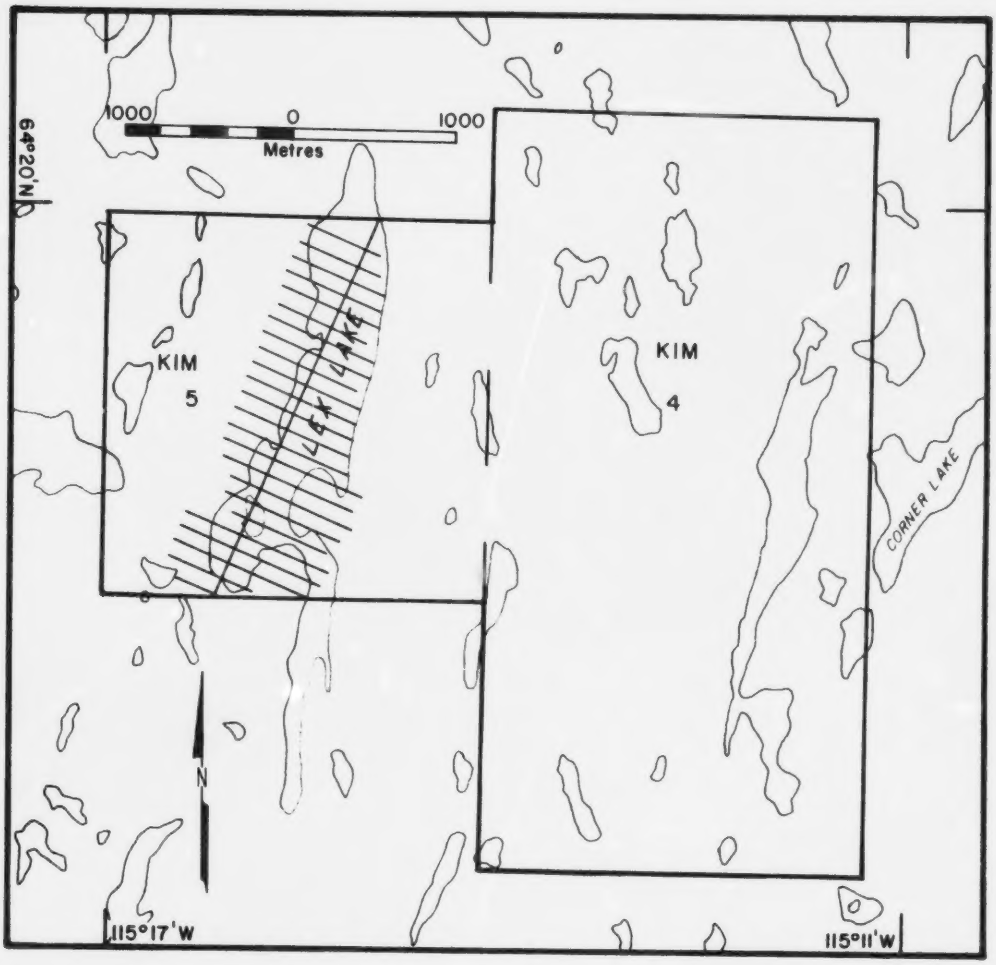


FIGURE 8-36: The KIM claims with geophysics grid.

CURRENT WORK AND RESULTS

Three geophysical surveys: proton magnetometer, VLF-EM, and Max-Min II horizontal loop, were conducted over the KIM 5 claim in the winter of 1983. The magnetometer and VLF-EM surveyed an 18.1 line km grid across Lex Lake (Fig. 8-36). The Max-Min survey covered the best conductors defined by the VLF.

The surveys identified three anomalies, all in the southern part of the grid. One of the anomalies, a magnetometer high associated with two parallel VLF conductors, appears to be cut by a northwesterly trending fault.

YELLOWKNIFE SUPRACRUSTAL BASIN

The Yellowknife Basin (Figs. 8-37, 8-38) as defined by Padgham (1981) includes marginal volcanic belts (including the Yellowknife and Beaulieu River-Cameron River Volcanic Belts) and an extensive area of turbidites deposited distally to the volcanic belts. The basin includes granitoid plutons, the larger ones having lobate outlines. The basin is bordered by Great Slave Lake to the south and gneissic terrain to the north.

The volcanic belts marginal to the basin host gold deposits and silver-base metal deposits. The turbidite sediments that fill most of the basin and the granitic rocks that intrude them host gold, quartz and rare metal pegmatites.

Work done in this area is listed below and in Table 8-1.

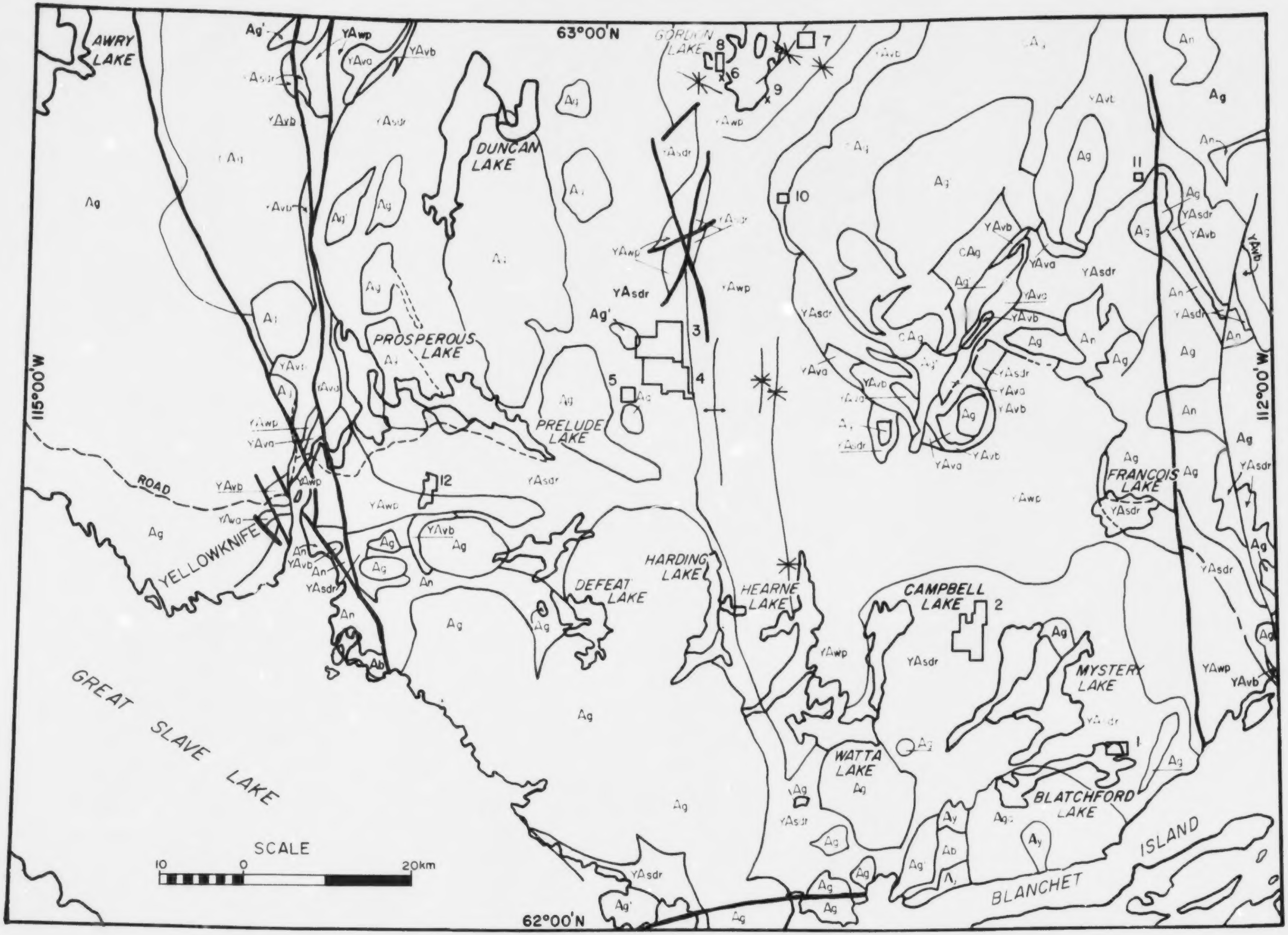

63°00'N
62°00'N
115°00'W
112°00'W
AWRY LAKE
DUNCAN LAKE
GORDON LAKE
PROSPEROUS LAKE
PRELUDE LAKE
HARDING LAKE
HEARNE LAKE
DEFEAT LAKE
CAMPBELL LAKE
FRANCOIS LAKE
MYSTERY LAKE
WATTA LAKE
BLATCHFORD LAKE
BLANCHET ISLAND
GREAT SLAVE LAKE
YELLOWKNIFE
ROAD
SCALE
10
0
20km
1
2
3
4
5
6
7
8
9
10
11
12
Ag
Ag'
An
Ab
Ay
CAg
YAwp
YAsdr
YAvb
YAva
YAvt

FIGURE 8-37: Regional geology and properties in the Yellowknife and Hearne Lake areas.

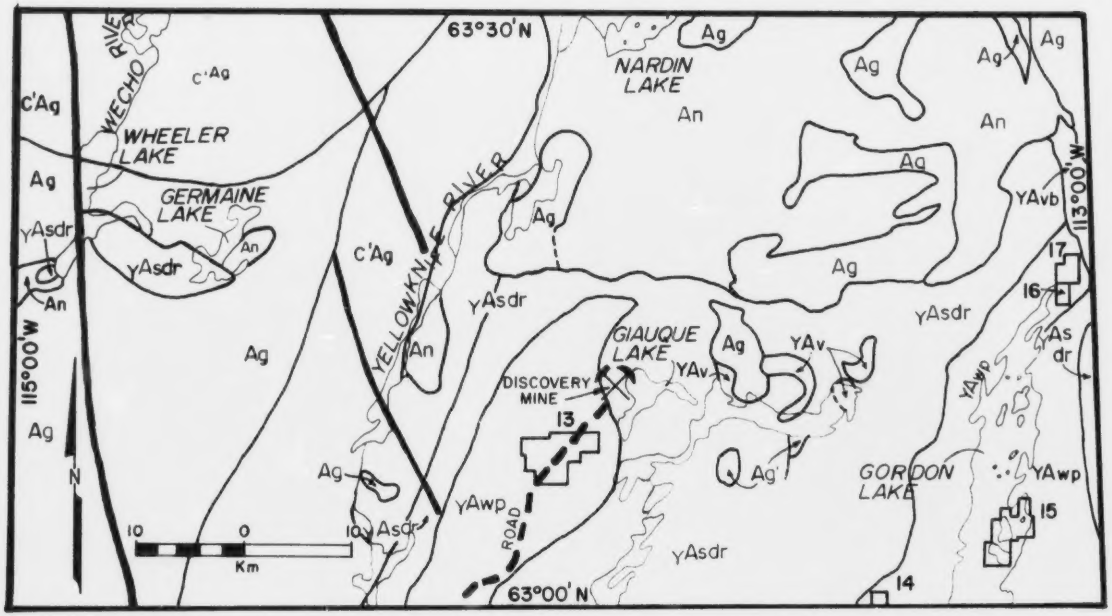

63°30'N
63°00'N
115°00'W
113°00'W
N
10
0
10
Km
WECHO RIVER
WHEELER LAKE
GERMAINE LAKE
YELLOWKNIFE RIVER
NARDIN LAKE
GIAUQUE LAKE
DISCOVERY MINE
GORDON LAKE
ROAD
C'Ag
c'Ag
Ag
An
YAsdr
Ag'
YAv
YAvb
YAwp
As dr
Asdr
13
14
15
16
17

FIGURE 8-38: Regional geology and properties in the Giaque Lake (Discovery Mine) and Gordon Lake areas. Geological symbols are the same as for Figure 8-37.

PROPERTIES

① BLAKE
② TA, TER claims
③ COVE, TABE, TCS claims
④ Thompson-Lundmark Mine Lease area
⑤ MAC
⑥ AM
⑦ JIM
⑧ MAHE
⑨ MQ-001
⑩ REG, RGE 2
⑪ LUCKY
⑫ NEGUS, PRW, PRWX, CAGEX fraction
⑬ JAKE, GREENLEE claims
⑭ CHRIS 1, 2
⑮ CATHY, GOO, JOE, LABOR, PAT claims
⑯ JANE
⑰ VEN

LEGEND FOR FIGURES 8-37 AND 8-38

(Geology by McGlynn, 1977)

PROTEROZOIC

Ay, Aga	Syenite, alkaline granite. May be younger than some Aphebian sedimentary sequences

ARCHEAN

Ag'	Late or post tectonic granodiorites and quartz monzonites
Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks
Ab	Gabbro, anorthosite, diorite and minor ultramafic rocks

YELLOWKNIFE SUPERGROUP

YAva'	Acidic lava, tuff, ash flow tuff
YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAwp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
YAva	Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks
YAvb	Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks

cAg	Complex of plutonic gneisses, commonly of tonalite composition, in part cataclastic, that are basement to Yellowknife Supergroup. May include some younger plutonic rocks

BLAKE CLAIM

M.L. Senkiw	Gold
Box 2614	85 I/1
Yellowknife, N.W.T., X1A 2P9	62°12'N,112°24'W

REFERENCES

Henderson (1976); Rowe (1952); Seaton (1978, 1983b).

DIAND assessment report 081637.

PROPERTY

BLAKE 1.

LOCATION

The claim is 105 km east-southeasterly of Yellowknife (No. 1 on Fig. 8-37) at the eastern end of Blatchford Lake.

HISTORY

Gold was discovered in the Blatchford Lake area in 1938. In 1942, tantalum and niobium were discovered to the east and southeast of the present BLAKE 1 claim (Rowe, 1952). Numerous claims were staked in the 1950's. During the last few years, work in the Blatchford Lake area has been predominantly for beryllium, tantalum, niobium and lithium (Seaton, 1978, 1983b).

The BLAKE 1 claim was recorded in August of 1982.

DESCRIPTION

The regional geology is shown in Figure 8-37. Henderson (1976) has compiled the geology of the Hearne Lake (85 I) and Yellowknife (85 J) areas at 1:125,000. About half the claim area is covered by water.

CURRENT WORK AND RESULTS

In the summer of 1982, the claim was prospected and 16 samples taken for gold analyses. Results indicate that low-grade concentrations of gold are present in scattered zones and are associated with carbonate breccia hosted in alkali gabbros and with quartz veins in Archean metasediments.

TA, TER CLAIMS

Terra Mines Ltd.	Gold
#202, 7608 - 103rd St.	85 I/7
Edmonton, Alta., T6E 4Z8	62°20'30"N,112°44'30"W

REFERENCES

Henderson (1976); Seaton (1978, 1984).

DIAND assessment report 081694.

PROPERTY

TA 1-8, TER 1, 2.

LOCATION

The claims are 85 km east-southeasterly of Yellowknife on the northern side of Bullmoose Lake (Fig. 8-37).

HISTORY

The TA claims were staked in 1939 for Consolidated Mining and Smelting Limited (Cominco). In 1968, Duke Mines Ltd. optioned the property. The TA 1-6 claims were recorded by Duke Mining Ltd. in April of 1976. Terra Mines Ltd. acquired ownership of the claims in 1981. TA 7 and TA 8 were recorded in August and October of 1983 respectively. The TER 1 claim was recorded in October, 1980 and TER 2 in April, 1983. The history of the claims is given in more detail by Seaton (1978, 1984), who cited additional references.

DESCRIPTION

The regional geology is shown in Figure 8-37. Henderson (1976) compiled the geology of the Hearne Lake (85 I) and Yellowknife (85 J) areas at 1:125,000. The claim group is underlain by isoclinally folded, knotted schists and greywackes of the Yellowknife Supergroup.

CURRENT WORK AND RESULTS

In the summer of 1983, a soil geochemistry survey was undertaken on the TER 1 claim to outline potential gold deposits. A test grid for orientation purposes was set up on the TA 3 claim over zones with gold-bearing quartz veins (Fig. 8-39), with lines at 50-m spacing and sample intervals of 5 m. A total of 36 samples were taken and analyzed for gold, silver, zinc, copper, arsenic and mercury. Gold, copper, zinc and arsenic were found to be good pathfinders for gold.

Another grid was then set up on the TER 1 claim (Fig. 8-39) with 50-m line spacing. Soil samples were taken at 15-m intervals along the lines. One hundred and sixty-five samples were taken and analyzed for gold, copper, zinc and arsenic. Numerous single-element anomalies were outlined, but no multi-element anomalies. Several arsenic anomalies were found in the northwestern part of the grid. No potential ore zones were indicated.

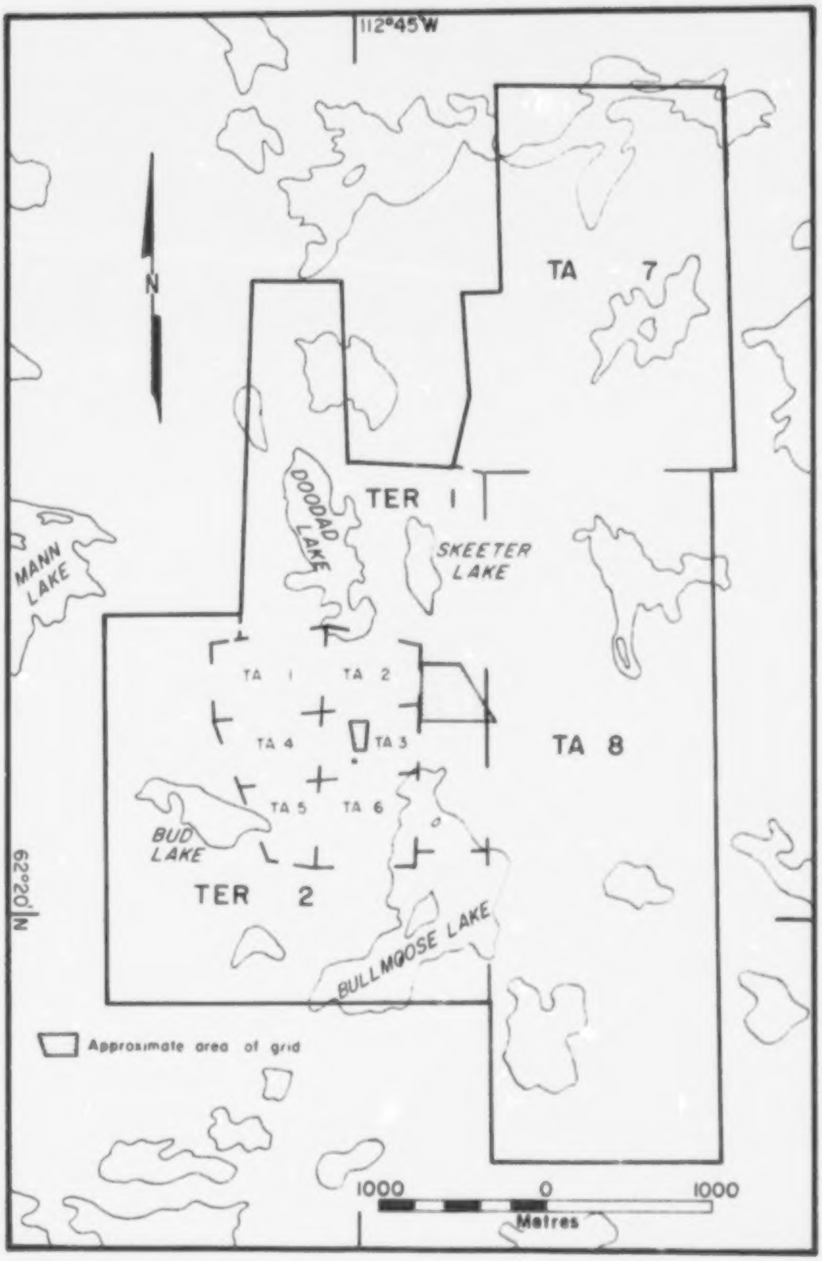

112°45'W
N
TA 7
TER 1
DOODAD LAKE
SKEETER LAKE
MANN LAKE
TA 1
TA 2
TA 4
TA 3
TA 8
TA 5
TA 6
BUD LAKE
TER 2
62°20'N
BULLMOOSE LAKE
Approximate area of grid
1000
0
1000
Metres

FIGURE 8-39: The TA and TER claims with cross-hatched soil geochemistry grid areas.

COVE, TABE, TCS CLAIMS

Tantalum Mining Corp.
of Canada Ltd.
P.O. Box 2000
Bernic Lake, Man., ROE OGO

Tantalum, Tin
85 I/11, 12
$62^{o}38'30"$N,$113^{o}30'$W

REFERENCES

Henderson (1976); Lord (1951).

DIAND assessment report 081683.

PROPERTY

COVE 1, TABE, TCS 1,2.

LOCATION

The claims (No. 3 on Fig. 8-37) are 50 km east-northeasterly of Yellowknife.

HISTORY

According to old claim maps, the TCS and COVE claims cover ground originally staked as parts of the GLID, REDOT, MACK, JERRY, WACO, ACME and DOT claims, among others; all staked in the late 1930's or early 1940's upon the discovery of gold in the area in 1938. In 1944 the Waco pegmatite sill was discovered on what is now the TCS 2 claim. Nothing was done on the Waco sill until 1961, when Thompson-Lundmark Gold Mines Ltd. explored it for tantalum and columbium. In August, 1981 and October, 1982, respectively, the TCS and COVE claims were recorded for Tantalum Mining.

The discovery of the Freda No. 1 pegmatite dyke, in 1944, led to the staking of the FREDA No. 1 claim (now TABE) by E. Sutherland. In 1945, stripping and blasting were undertaken over the dyke. Later that year Northern Tantalum and Rare Metals Ltd. acquired the claim, and a small milling operation was set up in 1946. By 1947, all significant work had stopped (Lord, 1951). In 1968 J.S. Turner examined the dyke.

The present TABE claim was recorded in August 1979 by Cominco Ltd. A joint venture agreement was held between Tantalum Mining and Cominco with respect to the TABE claim.

REGIONAL GEOLOGY

The regional geology is shown in Figure 8-37. Henderson (1976) has also done a compilation of the area at 1:125,000. The claims are underlain by deformed and metamorphosed Archean mafic volcanics, greywackes, shales and argillites of the Yellowknife Supergroup. These rocks are intruded by granitic stocks and associated northwesterly striking pegmatites.

CURRENT WORK AND RESULTS

In 1982 and 1983, two lithogeochemical surveys were undertaken over two grids. The first grid concentrated on the area covering the main pegmatite

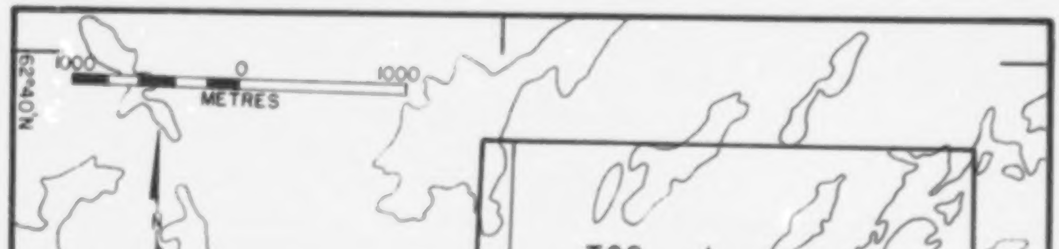


FIGURE 8-40: The COVE, TABE and TCS claims showing geochemical terrains.

bodies on the TCS 2 and TABE claims. The second grid overlapped the first and extended beyond it. Samples were taken every 91.4 m(300 ft) and 76.2 m (250 ft) respectively at 304 m (1000 ft) line spacing. The samples were taken of the country rock and analyzed for lithium for the purpose of identifying lithium aureoles caused by metasomatism during the intrusion of tantalum-bearing pegmatites.

Three geochemical terrains were outlined by the survey (Fig. 8-40). Two of the terrains (most of TCS 1, and TCS 2 and TABE east of 0+00 baseline) contained relatively few and isolated anomalies. The third terrain, covering the remainder of the claims, contained anomalies that followed a northerly trend believed related to structural features. Eight relatively strong anomalies were outlined, some caused by outcropping pegmatites.

Some of the pegmatites were sampled. A total of twenty-five samples were analyzed for tantalum and tin. The assays obtained were 0.028% Ta_2O_5 and 0.472% SnO_2 .

MAC CLAIM

J.R. Woolgar	Gold
P.O. Box 128	85 I/12
Yellowknife, N.W.T., X1A 2N1	62°35'N,113°34'30"W

REFERENCES

Henderson (1976).

DIAND assessment report 081691.

PROPERTY

MAC 1.

LOCATION

The claim is (No. 5 on Fig. 8-37) is 45 km east-northeasterly of Yellowknife and is about 1 km by 1 km in dimension.

HISTORY

Gold was first discovered on the property in 1947 and claims were staked in 1964 by J. Woolgar. These lapsed, as did claims staked in 1968 by Prospectors Mining Group. The MAC 1 claim was recorded in September of 1980.

DESCRIPTION

The regional geology can be seen in Figure 8-37. Henderson (1976) has also completed a compilation of the area at 1:125,000.

CURRENT WORK AND RESULTS

Geological mapping, prospecting and sampling, in June of 1983, researched for and tested a previously reported high-grade gold showing. The claims are underlain by Archean knotted biotite schists of the Yellowknife Supergroup. These sediments are intruded by granitic stocks and numerous pegmatite dykes. Five samples were taken and analyzed for gold. Only low assays were reported.

AM CLAIM

D. Nickerson	Gold
Box 1778	85 I/14
Yellowknife, N.W.T. X1A 2P4	62°56'30"N,113°20'W

REFERENCES

Henderson (1976); McGlynn (1971); Schiller (1965).

DIAND assessment report 081527.

PROPERTY

AM.

LOCATION

The claim is 75 km northeasterly of Yellowknife on the southwest shore of Gordon Lake (Figs. 8-37, 8-41).

HISTORY

The AM claim forms part of the TREACY and AM claims originally staked in 1946 and 1950 respectively. In 1950, trenching, milling and diamond drilling were done by Expander Mines and Petroleum Ltd. In 1962, the area was examined by Giant Yellowknife Mines Ltd. (McGlynn, 1971; Schiller, 1965). The AM claim was recorded by D. Nickerson in March, 1982.

DESCRIPTION

The regional geology of the area can be seen in Figure 8-37. A 1:125,000 compilation of the area has also been done by Henderson (1976).

CURRENT WORK AND RESULTS

Three showings of gold-bearing quartz veins, hosted by Yellowknife Supergroup greywackes and slates, were examined and sampled in August of 1982. A total of twenty-nine samples were taken and analyzed for gold and silver.

LUCKY CLAIM

Aber Resources	Gold
675 West Hastings St.	85 I/16
Vancouver, B.C., V6B 1N2	62°51'N,112°20'W

REFERENCES

Henderson (1976); Lord (1951); Seaton and Hurdle (1978).

DIAND assessment reports 081678, 017324.

PROPERTY

LUCKY.

LOCATION

The claim (No. 11 on Fig. 8-37) is 115 km east-northeasterly of Yellowknife. It is about 1 km by 1 km in dimension.

HISTORY

The LUCKY claim covers a portion of an area formerly known as the ALICE claim group. These claims were staked in 1938 when gold was first discovered on the property. Since then, the claims have been worked by various companies and drilling, trenching and mining carried out. The former Sunset Yellowknife Mine operated here from 1945 to 1947. A more detailed history of the ALICE claims is given by Lord (1951) and Seaton and Hurdle (1978). The present LUCKY claim was recorded in October of 1981 and is owned by J. Arden of Yellowknife from whom Aber Resources optioned the claim.

DESCRIPTION

The regional geology of the area is shown in Figure 8-37. Henderson (1976) compiled the geology of the area at 1:125,000. A more detailed map was made by Giant Yellowknife Mines Ltd. in 1966 at 1:400 (DIAND assessment report 017324). The claim is underlain by northerly trending mafic to intermediate volcanic flows, agglomerates and tuffs and thin beds of pyritic, cherty, felsic tuffs.

CURRENT WORK AND RESULTS

An evaluation of the property was made in June of 1983. Previous reports and results were examined. Seven samples from quartz veins in shear zones were taken and analyzed for gold. Low assays were reported.

GREENLEE, JAKE CLAIMS

Noranda Exploration Co. Ltd.	Gold
4 - 2130 Notre Dame Ave.	85 O/1; 85 P/4
Winnipeg, Man., R3H OK1	63°06'30"N,114°00'W

REFERENCES

Tremblay (1952).

DIAND assessment report 081542.

PROPERTY

GREENLEE; JAKE 10-13.

LOCATION

The claims (No. 13 on Fig. 8-38) are 75 km north-northeasterly of Yellowknife at and to the north and east of Morris Lake.

HISTORY

Gold was first discovered in the area in 1944. From 1944 to 1950, the area was prospected, geologically mapped, trenched and diamond drilled. Various companies conducted the exploration work and is summarized in Table 8-8.

In 1954 the assets of Greenlee Mines Limited were taken over by New Athona Mines Ltd. A more detailed history of the claims is given by Tremblay (1952).

In 1972 the POOL 1-6 claims were recorded by Precambrian Mining Services Limited, with the POOL 7,8 claims being recorded in 1973. These claims lapsed and were re-recorded as the GREENLEE claim for Bittern Investments Limited in August, 1979. In September, 1981, the claim was optioned to Noranda Exploration Co. Ltd.

TABLE 8-8: SYNOPSIS OF THE CLAIMS AND COMPANIES IN THE JAKE-GREENLEE PROPERTY REGION FROM 1944-1950

1944 - 1950

Present Claim	Claim Name	Company
JAKE 10,11,12 northern parts	TRI 1-18 and WALLIE 1-12	CIRCLE YK Mines Ltd.
JAKE 11	part of SB 1-12 claims and LUCKY 1-8	Beauregard YK Mines Ltd. Northland (1940) Mines Ltd.
JAKE 12, along the north shore of Morris Lake	RB 1-9, later restaked as POOL 9-11 claims	Centrix YK Mines Ltd. Greenlee Mines Ltd.
JAKE 12 (east and west central part) Greenlee	POOL 1-18, 12-18	Greenlee Mines Ltd.
JAKE 12,13 south-easterly of Morris Lake	STAR 1,3,13-15	Prospect Street Syndicate
JAKE 13	part of SB 1-12 claims	Beauregard YK Mines Ltd.

The JAKE 10-13 claims were recorded in April, 1981.

DESCRIPTION

The regional geology of the claims is shown in Figure 8-38. Tremblay (1952) has also mapped the area at 1:24,000. The claims are underlain predominantly by northeasterly striking metagreywackes and slates of the Archean Yellowknife Supergroup. A narrow belt of mafic metavolcanics or metadiabases trends northeasterly through the claims from Morris Lake. These metavolcanics/diabases are known to be gold-bearing at the Discovery Mine.

CURRENT WORK AND RESULTS

Ground magnetometer and VLF-EM surveys were conducted on the claims and a grid (JAKE C grid) was cut with a 5-km-long baseline (Fig. 8-41) in the spring of 1982. Stations for both surveys were taken at 25-m intervals.

A total of 28 magnetic anomalies and 32 VLF-EM anomalies were interpreted. Four of the magnetic highs and 3 of the VLF highs may possibly be related to gold and sulphide-bearing metabasalts or metadiabases.

CHRIS CLAIMS

Hidden Lake Gold Mines Ltd.	Gold
P.O. Box 2670	85 P/3
Yellowknife, N.W.T., X1A 2P9	63°00'30"N,113°24'30"W

REFERENCES

Baragar and Hornbrook (1963); Lord (1951); Moore and others (1951); Padgham and others (1976).

DIAND assessment report 081543.

PROPERTY

CHRIS 1,2.

LOCATION

The claims (No. 14 on Fig. 8-38) are 80 km northeasterly of Yellowknife on the south side of Murray Lake.

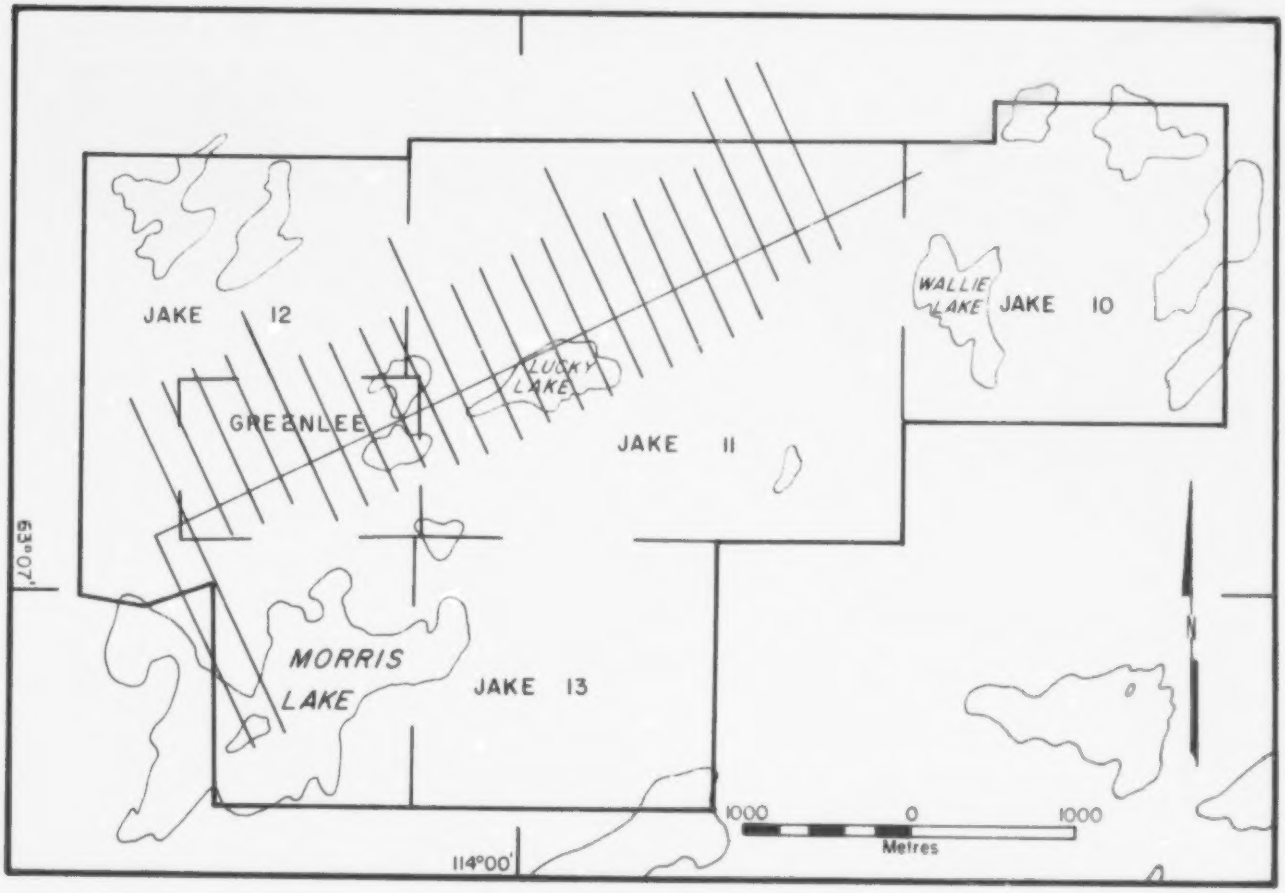


FIGURE 8-41: The JAKE and GREENLEE claims showing geophysics grid.

HISTORY

The claims were first staked as the PAN claims in 1937. From 1937 to 1940, numerous pits and trenches were dug, and a shallow shaft sunk (Lord, 1951). In 1957 and 1961, the claims were staked as the BAIRN claims, and trenches were re-opened and extended (Baragar and Hornbrook, 1963; Padgham and others, 1976). In 1970 the claims were staked as the MSSL claims by S. Otto and then transferred to North Star Mines Ltd. in 1972. The claims lapsed in 1977. The present CHRIS claims were recorded in August, 1980.

DESCRIPTION

The regional geology of the claims is shown in Figure 8-38. The geology of the area has also been compiled at 1:253,440 scale by Moore and others (1951).

CURRENT WORK AND RESULTS

The claims were prospected and old showings re-sampled and assayed for gold in the fall of 1982. Five showings (Zones 1, 3, 5, 6, 7) were examined; all, with the exception of Zone 1, were sampled (Fig. 8-43). A total of thirty samples were taken. The showings consist of gold-bearing quartz in veins, fractures, open space fillings and irregular masses, hosted in tight, isoclinally folded, Archean greywackes, slates and argillites of the Yellowknife Supergroup.

In the past, assays up to 58.3 g/tonne Au over 1.2 m have been reported for Zone 1 and up to 123.1 g/tonne A for Zone 7.

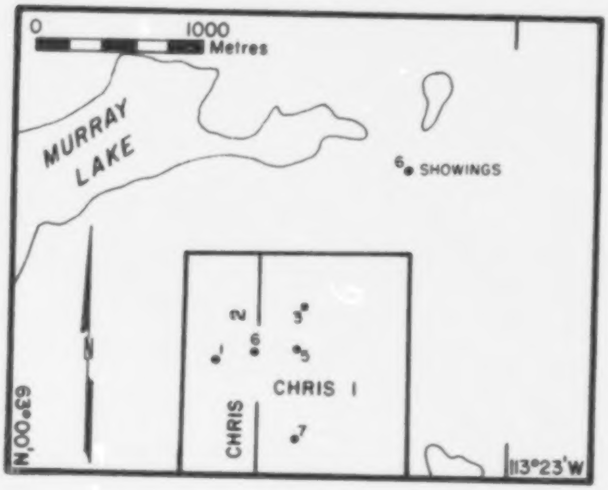


FIGURE 8-42: The CHRIS claims and showings examined.

CATHY, GOO, JOE, LABOR, PAT CLAIMS

Burnt Island Gold Ltd.	Gold
801, 837 West Hastings St.	85 P/3
Vancouver, B.C., V6C 1B6	63°04'30"N,113°08'30"

REFERENCES

Baragar (1962); Moore and others (1951); Schiller and Hornbrook (1964); Seaton (1984).

DIAND assessment reports 081544, 017377.

PROPERTY

CATHY 1-4, GOO 1-7, JOE 1, LABOR 1, PAT.

LOCATION

The claims (No. 15 on Fig. 8-38) are 95 km northeasterly of Yellowknife in the central part of Gordon Lake.

HISTORY

The various claim areas have had different histories, as follows:

GOO claims: Gold was first discovered on the property in 1936 and was staked as the ARDOGO claims. In the 1940's the ground was re-staked as the GOOD HOPE and part of the EAST HOPE groups and the TEEN claim. The northern part of the property was staked as the TICK group. In 1958, the GOO 1-9 and TRE 10 claims were staked, with all but GOO 4, 5 lapsing by 1969. In 1969 a twenty-one year lease was applied for comprising the GOO 4, 5 claims and was received in 1972. The GOO 1, 2 claims were re-staked in 1973, but again lapsed. In February, August and September of 1980 the GOO 1, 2, 3, 6, 7 claims were recorded and transferred to Burnt Island Gold Ltd. in February, 1981 (Seaton, 1984; Schiller and Hornbrook, 1964).

JOE, LABOR AND CATHY claims: In the 1940's the NORTHRUP claim group was staked over what is now the JOE claim; and the HAZEL claims covered the area of the present CATHY and LABOR claims (according to old claim maps). In 1958 and 1959, these claim groups were re-staked as the DARK and EGAR claims. The DARK claims lapsed in 1976 (Baragar, 1962).

The JOE claim was recorded in August, 1980, LABOR 1 in September, 1980 and CATHY 1-4 in August, 1981. By the end of 1981, all of the claims had been transferred to Burnt Island Gold Ltd.

PAT claim: The PAT claim forms part of what was the GOLDFLAKE and LAURA claims in the 1940's (according to old claim maps). In 1961, the claims were re-staked as the GY claims and transferred to

Giant Yellowknife Mines Ltd. (DIAND assessment report 017377).

The present PAT claim was recorded in March, 1981 for Burnt Island Gold Ltd.

DESCRIPTION

The regional geology is shown in Figure 8-38. A map at 1:253,440 has also been compiled by Moore and others (1951). The claims are underlain by Archean slates, argillites and greywackes of the Yellowknife Supergroup.

CURRENT WORK AND RESULTS

Geological mapping, sampling and diamond drilling tested the claims in the summer of 1982.

Detailed geological mapping was carried out at 1:5,200 scale over the islands on the claims. Quartz systems were mapped at 1:200 and the shaft on GOO 5

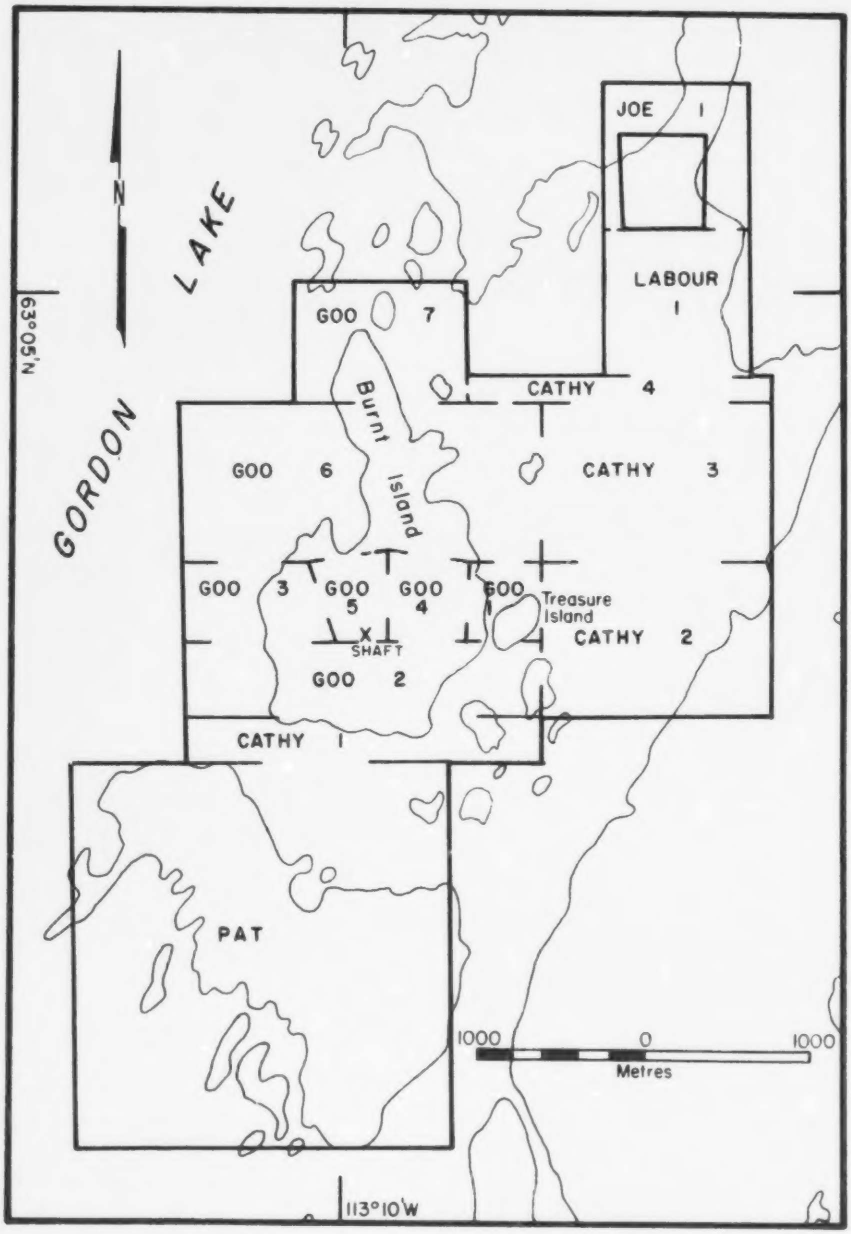

N
GORDON LAKE
63°05'N
JOE 1
LABOUR 1
GOO 7
CATHY 4
Burnt Island
GOO 6
CATHY 3
GOO 3
GOO 5
GOO 4
GOO 1
Treasure Island
CATHY 2
X SHAFT
GOO 2
CATHY 1
PAT
1000
0
1000
Metres
113°10'W

FIGURE 8-43: The CATHY, GOO, JOE, LABOR and PAT claims.

was mapped at 1:20 (Fig. 8-43). Numerous quartz veins were found on both Green and Treasure Island, usually occupying troughs and limbs of synclinal folds or associated with drag folds. In the Shaft Zone, good gold concentrations were reported in a vein cutting across the nose of a steeply plunging synclinal fold.

Sampling of quartz veins and previously trenched areas revealed no economic gold concentrations.

Two holes were drilled in the Treasure Island area (Fig. 8-44). One hole intersected two small quartz veins carrying visible gold. Sampling of the core revealed sub-economic amounts of gold.

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